

IMPERIAL INSTITUTE
OF
AGRICULTURAL RESEARCH, PUSA.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture
assisted by
The Staff of the Agricultural Department.

VOLUME XIV.

1917.

PUBLISHED BI-MONTHLY.

PRINTED BY THE ARGUS P. & P. CO., LTD., SALISBURY, RHODESIA.

Table of Contents.

EDITORIAL: PAGE

Farm Statistics ... 1
Ocean Freight on Stud Animals for Rhodesia ... 2
Horsesickness ... 3
Export of Cows ... 4
Samples for Examination ... 4
Turkish Tobacco ... 5
Seed Potatoes ... 6
Chemical Analysis ... 6
Mr. W. S. Wood ... 6
Farm Homesteads ... 6
The Rand Show ... 7

ARTICLES:

The Soils of Southern Rhodesia and their Origin, by H. B. Maufe, B.A. ... 8
Beef Feeding Experiment No. 3, by R. C. Simmons ... 24
Notes on the Returns of Crops Harvested in 1916, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S. ... 29
Purchase of Rhodesian Maize by the Imperial Government ... 38
Quarter Evil, by C. R. Edmonds, M.R.C.V.S., and G. Pinchin, M.R.C.V.S. ... 43
Nature Notes—I. The Emperor Moths of Southern Rhodesia, by Rev. Father O'Neil, S.J. ... 47
Cultural Notes on Rhodesian Crops, by J. A. T. Walters, B.A. ... 61
Marketing Cattle in the United States ... 66
Wheat Production in Southern Rhodesia ... 68
Hints on Explosives, by W. M. Watt ... 70
Pound Fees ... 76
Salisbury Fat Stock Show—Block Test Results ... 80
Correspondence ... 83
The Agricultural Outlook ... 88
Veterinary Report for November and December ... 89
Width of Tyres Ordinance, 1916 ... 93
Merino Sheep on the Government Experiment Farm, Gwebi ... 94
Farming Calendar ... 95
Weather Bureau ... 101
Dates of Meetings of Farmers' Associations ... 109
Departmental Notices ... 110
Departmental Bulletins ... 125
Government Notices ... 129

Up-to-Date Farmers !

. . . TRY . . .

"ARSENODA" Cattle Dip

The most effective and economical dual-purpose Dip in South Africa.

"SWABOLINE" TICK GREASE, for "swab" or hand dressing.

"HOLMSOL."—Highest standardised disinfectant and germ destroyer.

Order through your local store, or from Sole Importing Agents in Rhodesia :

Mashonaland :
A. W. PARTRIDGE,
Salisbury.

Matabeleland :
MEIKLE BROS.,
Bulawayo & Gwelo.

Table of Contents.

EDITORIAL : PAGE

Government Experiment Stations ... 155
Agricultural Congress ... 156
Dates of Agricultural Shows, 1917 ... 157
Dhal ... 157
Immunity : An Appreciation ... 158
Nature Notes ... 159
Fat Stock Show—Correction ... 159
Inoculation ... 159

ARTICLES :

Prospects of the Maize and Tobacco Crops of 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. ... 160
Maize Grading, 1917, by J. A. T. Walters, B.A. ... 164
Transmission of Cattle Trypanosomes by Flies other than Tsetse, by H. E. Hornby, M.R.C.V.S., D.V.S.M. ... 168
Winter Wheat, by J. A. T. Walters, B.A. ... 177
Production of Winter Wheat on Granite Formation in Rhodesia, by Cecil Wilmot ... 180
Statistics of Live Stock and Animal Produce for the Year 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. ... 184
The Rhodesian Farm Orchard, by A. G. Turner ... 189
A Useful Hay Rack ... 195
Rhodesian Beef on Smithfield Market ... 196
An Investigation of the Oxidation of Cattle Dips when Bottled, by A. W. Facer ... 202
The Turnip Sawfly, by R. W. Jack, F.E.S. ... 206
Immunity in its Relation to the Stock Diseases of Southern Rhodesia, by L. E. W. Bevan, M.R.C.V.S. ... 213
Cultural Notes on Rhodesian Crops, by J. A. T. Walters, B.A. ... 235
Nature Notes—II. Cicadas and their Relatives, by C. H. Pead, M.I.M.M. ... 240
Diseases of Poultry, by Frank Sheppard ... 248
Correspondence ... 251
Maize and Wheat Bread ... 256
The Agricultural Outlook ... 257
Veterinary Report for January and February ... 258
Farming Calendar ... 261
Weather Bureau ... 265
Dates of Meetings of Farmers' Associations ... 273
Departmental Notices ... 274
Departmental Bulletins ... 285
Employment on Farms ... 289
Government Notices ... 290

Up-to-Date Farmers !

. . . TRY . . .

"ARSENODA" Cattle Dip

The most effective and economical dual-purpose Dip in South Africa.

"SWABOLINE" TICK GREASE, for "swab" or hand dressing.

"HOLMSOL."—Highest standardised disinfectant and germ destroyer.

Order through your local store, or from Sole Importing Agents in Rhodesia :

Mashonaland :
A. W. PARTRIDGE,
Salisbury.

Matabeleland :
MEIKLE BROS.,
Bulawayo & Gwelo.

Table of Contents.

EDITORIAL: PAGE

Government Experiment Farm, Gwebi ... 311
Potatoes ... 312
Encouragement of Poultry Farming ... 312
Sale of Stud Cattle ... 313
Salisbury White Maize in Australia ... 313
Shortage of Farm Supplies ... 314
Farmers' Directory ... 314
Farm Statistics ... 314
The Late Mr. George Pinchin ... 315
Corrections ... 316
Acknowledgment ... 316

ARTICLES:

Extracts from the Report of the Director of Agriculture for the Year 1916 ... 317
New Crops for Rhodesia, by J. A. T. Walters, B.A. ... 327
How to Build a Cattle Crush—Two Methods ... 332
Nature Notes—III. Adaptation, by C. F. M. Swynnerton, F.L.S. 339
Rhodesia Maize Fertiliser, by A. G. Holborow, F.I.C. ... 357
Merino Sheep at the Government Experiment Farm, Gwebi, by R. C. Simmons ... 359
Rose Culture, by N. L. Kaye Eddie ... 362
Directory of Farmers in Southern Rhodesia ... 366
St. Faith's Mission Dip, by Rev. E. Lloyd ... 400
Hereford Breeders' Society ... 402
Correspondence ... 403
The Agricultural Outlook ... 407
Veterinary Report for March and April ... 408
Farming Calendar ... 412
Weather Bureau ... 416
Dates of Meetings of Farmers' Associations ... 424
Departmental Notices ... 425
Departmental Bulletins ... 437
Employment on Farms ... 441
Government Notices ... 442

Up-to-Date Farmers !

. . . TRY . . .

"ARSENODA" Cattle Dip

The most effective and economical dual-purpose Dip in South Africa.

"SWABOLINE" TICK GREASE, for "swab" or hand dressing.

"HOLMSOL."—Highest standardised disinfectant and germ destroyer.

Order through your local store, or from Sole Importing Agents in Rhodesia :

Mashonaland :
A. W. PARTRIDGE,
Salisbury.

Matabeleland :
MEIKLE BROS.,
Bulawayo & Gwelo.

Table of Contents.

EDITORIAL : PAGE

The Meat Export Trade ... 461
Birds as Tick Destroyers ... 463
Rand Fat Stock and Maize Show ... 465
Illustrations ... 466

ARTICLES :

Extracts from the Report of the Director of Agriculture for the Year 1916 ... 467
Abridged Report of the Chief Veterinary Surgeon for the Year 1916 ... 479
Quarter Evil—Its History in Rhodesia, by C. R. Edmonds, Assistant Chief Veterinary Surgeon ... 483
Trees suitable for the Farm and for Ornamental Purposes, by W. E. Dowsett ... 487
Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C. ... 491
Farming in Granite Country, by R. C. Simmons ... 495
The Market for Sunflowers ... 508
An Easy Method of Making an Iron Trough for Cattle or Pigs, by C. J. Shirley ... 517
Odzani River Irrigation Scheme, Umtali District, by W. M. Watt 518
Broom Corn ... 521
Nature Notes—IV. Plant Collecting, by F. Eyles, F.L.S. ... 523
The Agricultural Outlook ... 530
Veterinary Report for May and June ... 531
Farming Calendar ... 535
Weather Bureau ... 540
Dates of Meetings of Farmers' Associations ... 548
Departmental Notices ... 549
Departmental Bulletins ... 563
Employment on Farms ... 567
Government Notices ... 569

An Open Letter to the Farmers in Rhodesia.

P.O. Box 256,
Durban,
26th June, 1917.

GENTLEMEN,

Two years ago Holmes' **"ARSENODA"** Cattle Dip was practically unknown to you: to-day it has established itself as one of the most popular Dips south of the Zambesi.

Had not **"ARSENODA"** come to the rescue 18 months ago, very many farmers would have been in a serious position with East Coast Fever then in existence.

"ARSENODA" has not disgraced itself, but on the other hand has been rightly appreciated as a tick-destroying medium by the Department of Agriculture, the B.S.A. Co., numerous Ranches, etc., etc.

"ARSENODA" as a proprietary Dip economically stands **first;** hence on commercial lines—which, after all, are what every farmer has to consider in conducting a profitable business—it is left to you to decide which Dip you will use.

Unfortunately, owing to the disorganised condition of affairs at Home, coupled with the very limited shipping space, it has been impossible to keep up abundant supplies, and while the war lasts we strongly advise every farmer to assist our Agents and others stocking **"ARSENODA"** to order well ahead.

Yours faithfully,
HOLMES & CO.,
Proprietors.

Sole Importing Agents in Rhodesia:

Mashonaland:
A. W. PARTRIDGE,
Salisbury.

Matabeleland:
MEIKLE BROS.,
Bulawayo & Gwelo.

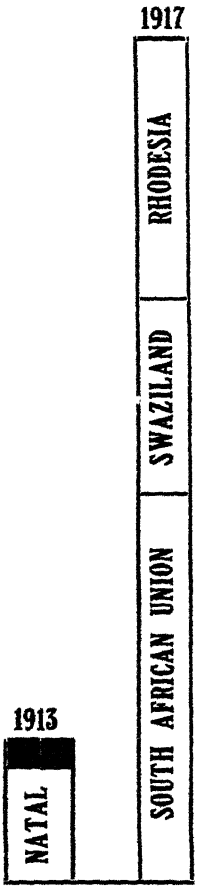
Table of Contents.

EDITORIAL: PAGE

Agricultural Statistics ... 695
Sale of Maize to the Imperial Government ... 696
Drying out of Rhodesian Maize ... 697
Resources of Rhodesia ... 698
Cattle Statistics ... 698
War Settlement Department ... 699
Locusts ... 700
Prize for Wheat Growing ... 701
Protection of Koorhaan ... 701
Stone Dipping Tanks ... 701

ARTICLES:

War Settlement in Southern Rhodesia ... 702
The Maize Stalk Borer, by Rupert W. Jack, F.E.S. ... 707
Report on Crop Experiments at the Government Farm, Gwebi, Season 1916-17, by Eric A. Nobbs, Ph.D., B.Sc. ... 717
A Farm Cheese and Butter Dairy, by R. C. Simmons and G. U. Fripp ... 727
The Restraining Influence of Cyanide upon Oxidation in Arsenical Dips, by A. G. Holborow, F.I.C. ... 733
New Crops for Rhodesia, by J. A. T. Walters, B.A. ... 737
Nature Notes—VII. Bird Life on an Umtali Farm, by Lionel Cripps, M.L.C. ... 743
Reports on Oil Seed by the Imperial Institute ... 749
Imperial Institute of the United Kingdom, the Colonies and India 752
Broom Corn, by J. A. T. Walters, B.A. ... 755
Maize Foods for the Home ... 757
Cattle Statistics ... 763
The Agricultural Outlook ... 764
Veterinary Report for September and October ... 765
Farming Calendar ... 767
Weather Bureau ... 773
Dates of Meetings of Farmers' Associations ... 781
Departmental Notices ... 782
Departmental Bulletins ... 785
Employment on Farms ... 789
Government Notices ... 790



"Arsenoda"

CATTLE DIP

Made its debut in Natal in 1913. To-day it is known and used from the Cape Province to Rhodesia, as this diagram indicates.

A BETTER DIP HAS YET TO BE PROVED.

In conjunction with **"ARSENODA"** every farmer should have

"SWABOLINE"

(Tick Grease)

AND

"HOLMSOL"

(Standardised Disinfectant Fluid).

PROPRIETORS:

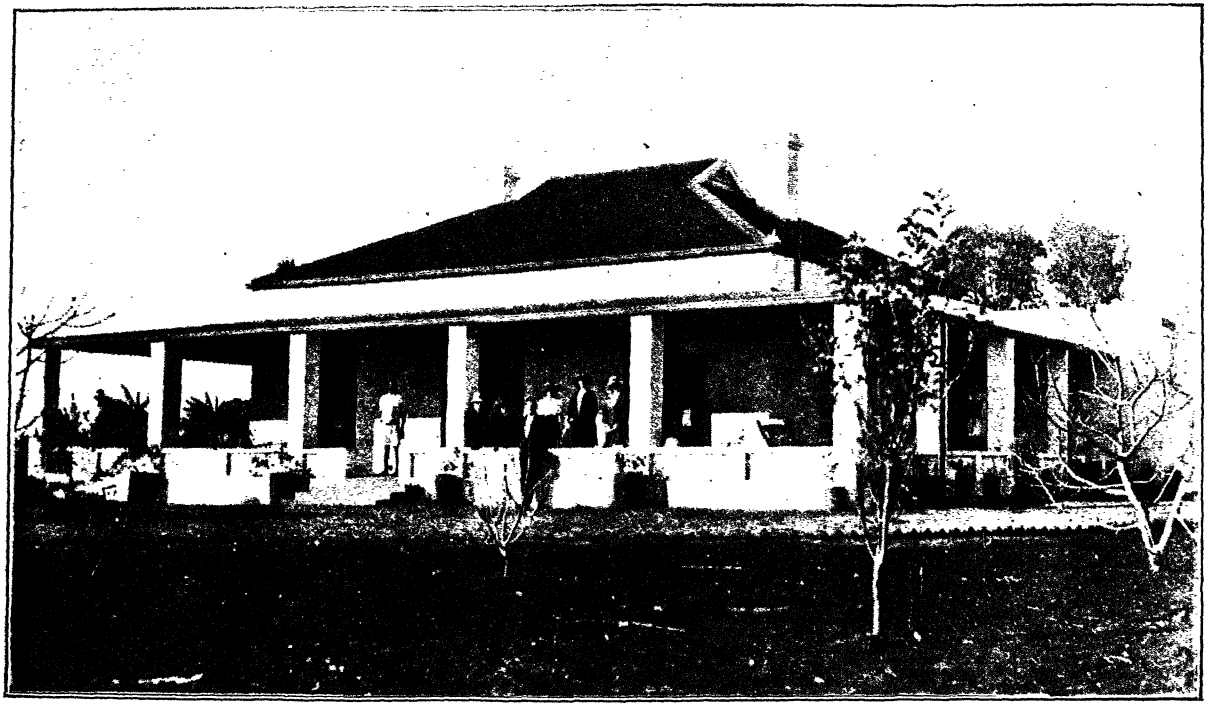
HOLMES & CO.,

P.O. Box 256 :: DURBAN.

Sole Importing Agents in Rhodesia:

Mashonaland:
A. W. PARTRIDGE,
Salisbury.

Matabeleland:
MEIKLE BROS.,
Bulawayo & Gwelo.



Mr. J. F. Templeton's Homestead, Farm Glenluce.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—NO. 1.] FEBRUARY, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

FARM STATISTICS.—The last statistical forms sent out have been returned in a very satisfactory manner, that is the form asking for a statement of stock as at the 31st December last and an estimate of coming crops. There are, however, some few farmers who have not yet forwarded their returns, and we would remind them of the necessity of doing so quickly, in order that returns of the live stock in the country and the acreage planted to maize in the various districts may be published as soon as possible. Several men have written in to

say that no form had reached them. Should there be others who have been accidentally overlooked, we should be greatly obliged if they would write immediately and let us know, so that forms may be sent them. We may also mention that we are still receiving a few forms without either signatures or addresses, and we trust farmers will in future be very careful in this respect.

Ocean Freight on Stud Animals for Rhodesia.—The Administration and the London Board of the British South Africa Company, acting in conjunction with the South African Shorthorn Society, have recently been in correspondence with the Union-Castle Mail Steamship Company with the object of endeavouring to induce the latter to extend to Rhodesia the free freight concessions for pedigree stock, or, as an alternative, to remove the restriction on the re-exportation to Rhodesia of cattle imported into the Union of South Africa under the concessions. Unfortunately for the stock breeders of Rhodesia, the negotiations have not been successful. The position is explicitly stated in a final letter from the Union-Castle Company to the British South Africa Company, given in full below:—

Union-Castle Mail Steamship Company, Ltd.,

London, 27th November, 1916.

The Secretary,
The British South Africa Company,
London.

Sir,

We duly received your letter of the 21st inst. emphasising again the advantages which might naturally be expected to result from the increased importation into Rhodesia of pedigree stock for breeding purposes, and suggesting, with that object in view, the extension to Rhodesia of the conditions of clause 50 of the present South African Mail Contract, or the removal of the restrictions thereby imposed upon the transfer to other territories of stock imported into the Union from Europe free of freight.

We duly received from the Shorthorn Society of South Africa the representations on this subject to which you have

alluded. In reply to your observations, however, we would point out that, in addition to the existing limitation of space, there are other considerations which render impracticable such an extension of the free conveyance of stock to places beyond the Union as that now in question.

The offer of this concession for the benefit of cattle breeders in the Union formed an integral part of the negotiations connected with the South African Mail and Government Freight Contracts concluded in 1912, and, while we have every confidence in the future beneficial results of this policy to the whole of South Africa, it must be obvious that the arrangement in question has already involved great expense as well as loss of revenue to this Company, and therefore, to our regret, we do not see our way to extend similar facilities to stock consigned to territories outside of the Union.

We may add that in our reply we reminded the Shorthorn Society of Molteno, C.P., that the terms of the Mail Contract do not preclude the transfer to other territories of pedigree stock imported free of freight into the Union, after the lapse of three years, and therefore, seeing that free importation into the Union began at the close of 1912, it must henceforth be feasible for either imported animals or their progeny to be acquired by breeders in Rhodesia or elsewhere for the improvement of their herds, but, for the reasons already indicated, we could not agree to the abolition or shortening of the time limit of three years after importation, which was deemed by all concerned as a reasonable condition.

We are, etc.,

UNION-CASTLE MAIL STEAMSHIP COMPANY, LTD.

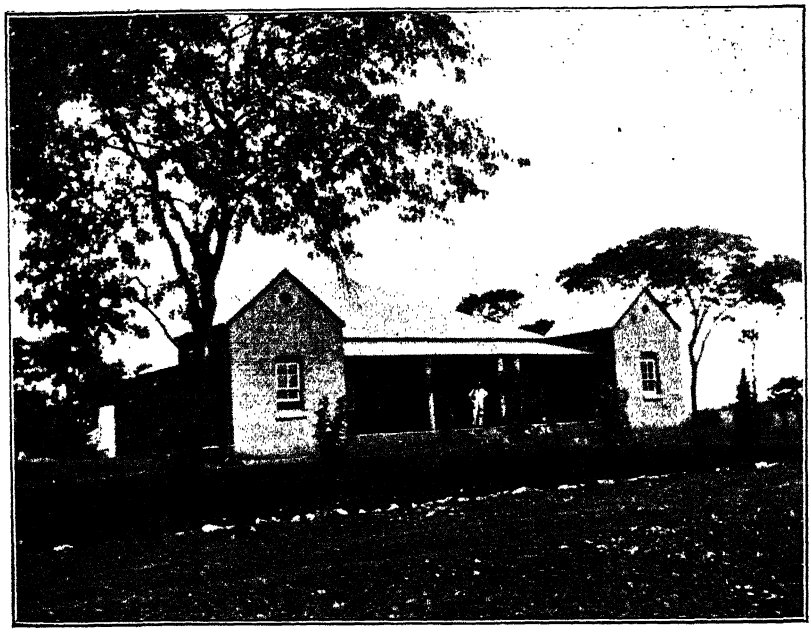
HORSESICKNESS.—Referring to the intimation in the last issue of this *Journal* to the effect that the Director of Veterinary Research, Pretoria, had placed a small quantity of material for the inoculation of horses against horsesickness at our disposal, we are now advised by Sir Arnold Theiler that he has had to postpone further inoculation. The Veterinary Department is therefore not in a position to undertake the application of this treatment to horses at present.

EXPORT OF COWS.—In connection with the export of slaughter stock to the Johannesburg and Pretoria markets, it has been observed that in several cases cows in calf and cows with calves at foot have been included in mobs intended for slaughter. The subject has been discussed with the Executive Committee of the Agricultural Union, and it has been agreed that no such cows shall be allowed out of the country for slaughter purposes; permits will accordingly not be issued for export, for slaughter purposes, of cows in calf or with calves at foot. This step should not only prevent the loss to this country of breeding stock, but also prevent unsuitable animals from being sent to the abattoirs and so injuring the high reputation that Rhodesian cattle have already gained there. It is to be noted that the Union does not permit of the importation of cattle from Rhodesia except direct to the quarantine areas of abattoirs pending slaughter.

SAMPLES FOR EXAMINATION.—Under Departmental Notices at the end of the *Journal*, the following notice appears in each issue:—

> "In connection with enquiries, especially with regard to diseases amongst crops, insect pests, soils, grain and the identification of plants, specimens should, wherever possible, be sent, together with full details. It is found that such parcels are often forwarded without any indication of where they are from or why they were sent and it is difficult in such cases to trace the sender. It is, therefore, requested that persons, when forwarding samples for examination, indicate clearly their name and address on the package, so as to enable their requirements to be attended to without delay."

We fear that this is not carefully read by many of the correspondents of the Agricultural Department, and we wish again to emphasise its importance. Material for examination, upon which the report of an expert is desired, is far too frequently received without any label or other aid to the identification of its place of origin, the name of the sender, or the purpose for which it has been forwarded. Sometimes a letter accompanies, or follows the sample, giving certain details. Some-



Mr. T. H. Newmarch's Homestead, Farm Glenara.



Oat Harvest, Mr. R. H. Futter's Farm, Makwiro.

times there is no letter. We must point out that a letter by itself is not sufficient. For instance, if the Chemist receives together several bottles of dip for analysis and none of them has identification marks, it will be difficult, or impossible, for him to know where each one came from, even though all of them may be accompanied by letters. He may sometimes be able to place them correctly by means of a comparison of handwritings, or otherwise, but it is obvious there is a risk in doing this and a possibility of serious error. It is no uncommon thing for the Chemist to receive a bottle of animal viscera with nothing to tell him why it was sent in or whence it came, and for the information to be obtained too late, that is after the material has become decomposed.

Therefore, it is most important that every sample sent to this Department, whether to the Chemist, the Bacteriologist, the Entomologist or the Botanist, should be accompanied by a label, or other document, the same to be actually attached to or included in the wrappings of the sample itself. Such label should state the name and address of the sender, the nature of the material sent, and the reason for its being forwarded.

The public can hardly expect that attention should be paid to samples of unknown origin, especially as the departmental reports are in most instances made free of charge.

Turkish Tobacco.—We have previously brought to the notice of growers the renewed demand for Rhodesian Turkish tobacco, and we are now once more advised that, owing to the failure of supplies from the Balkans, experts in London are drawing attention to the unrivalled market which exists there for Rhodesian Turkish tobacco leaf, and are urging growers to seize this opportunity, stating that a price of 3s. 6d. to 4s. per lb. is now assured for Rhodesian leaf of a quality similar to samples recently sent to England. This confirms the advice given to growers during the past eighteen months. Unfortunately, owing to the discouraging prices given in the past for Rhodesian Turkish tobacco, the cultivation of this type of leaf has almost entirely

ceased, growers having been once bitten being now very shy to take it up again. At this time of year, of course, there is no possibility of planting, but anyone interested and skilled in the cultivation of this particular product might be well advised to consider taking it up again next season.

SEED POTATOES.—A year ago we warned potato growers not to rely on the merchants for their supply of seed, because we were informed that the importations of seed potatoes last season would be small. We take this opportunity to repeat and emphasise that warning for the present season, for we hear on reliable authority that the scarcity of imported seed potatoes will be greater than ever.

CHEMICAL ANALYSIS.—Owing to the absence of the Agricultural Chemist on war service and the Assistant Agricultural Chemist on prolonged sick leave, the analysis of agricultural products, soils, etc., is temporarily suspended. The examination of cattle dip samples will, however, be continued.

MR. W. S. WOOD, lately manager of the British South Africa Company's Shangani Estate, has resigned that position and gone to England, where we understand he will be prepared to undertake the purchase of pedigree stock for export. His knowledge of Rhodesian conditions, and particularly of ranching in this country, should qualify him for this business, and should make his advice and assistance very useful to local buyers.

FARM HOMESTEADS.—In this number we reproduce photographs of two typical Rhodesian farm homesteads. When we say "typical," we mean that they are the kind of houses built by farmers who have been long enough in the country to "make good," as it is sometimes tersely expressed. We believe these pictures will be examined with interest, not only by our

local readers, but also by our many friends overseas who have their eyes on Rhodesia. If any farmers care to send along photographs of their homes, we shall be glad to publish them from time to time as space permits, provided the prints sent are good enough for reproduction in the *Journal*. We do not wish to confine ourselves to this larger class of building, but should be glad also to reproduce photographs of the less pretentious homestead being used by men who are still in the early stages of establishing themselves on the land.

THE RAND SHOW.—The eleventh annual show of the Witwatersrand Agricultural Society will be held at Milner Park, Johannesburg, at Easter. The show will last for six days, extending from Wednesday, 4th, to Tuesday, 10th April. The prize list, as usual, is a very handsome one, amounting in the aggregate to over £5,000 in cash alone. Doubtless many Rhodesians will be attracted to this great show, which, in addition to the usual classes for stock and produce, will include classes for home industries, trades and industrial schools.

The Soils of Southern Rhodesia and their Origin.

By H. B. Maufe, B.A., Director of the Geological Survey.

Presidential address delivered at the annual meeting of the Rhodesia Scientific Association, 23rd June, 1915. Reprinted by permission from the proceedings.

The proceedings of our Association contain few records of investigation into the soils of Rhodesia. Mr. De Laessoe's paper on the Sabi and Lundi Rivers† notes the character of the soils on the banks of those rivers, but for any discussion of the characteristics of Rhodesian soils in general we have to go back nearly twelve years to an excellent little paper by the late John Cameron.‡ This is the more remarkable in view of the advances which have been made since 1903, not only in soil investigation, but in the general advance of agriculture in Rhodesia. I propose to address you on some points bearing on the origin of Rhodesian soils. I lay emphasis on the point of view of "origin," because, when you desire to understand a thing thoroughly and can get at its origin, you always find you have got a sure knowledge which helps you to understand what before seemed very puzzling and perhaps anomalous.

Many people, even those who cultivate the soil, whether for a living or merely for the pleasure of a garden, look on it as so much dirt under their feet, something changeless and inert. As a matter of fact it is neither one nor the other.

† De Laessoe, H., "The Lundi and Sabi Rivers." *Proc. Rhod. Sci. Ass.*, vol. vi., pp. 118-138. 1907.

‡ Cameron, John, "Characteristics of Rhodesian Soil." *Proc. Rhod. Sci. Ass.*, vol. iv., pp. 52-66. 1904.

Every rain-storm and every wind carries off some particles from the surface; the rain-water which soaks in brings about chemical actions which produce more soil below the surface, and the activities of bacteria, plants and animals render it anything but inert. Every soil is a complex material and has an interesting history. The majority of soils are a mixture made mostly of decayed rock, with a greater or less amount of decayed plants, and perhaps some animal remains. It is a commonplace to remind you to-day that the hills are not everlasting: that they are being ceaselessly worn away by the action of air, rain and rivers, heat and frost, a number of factors which, taken together, make up the climate. We are all familiar with the fact that a species of plant or animal, brought into a new climate, frequently undergoes some modification. The biologist calls it adaptation to environment. The chemist makes known to us the changes which non-living substances undergo when subjected to changes of temperature, pressure and so forth; that is, when their environment is altered. He calls them "stable" or "unstable" according to the degree of change under a given treatment. We seldom realise that this adaptation to environment is going on ceaselessly over every square inch of the surface beneath our feet. In a mining country like Southern Rhodesia, nearly everybody is a bit of a geologist, and knows that most rocks belong to one of three classes. They may be sediments which have been deposited at the bottom of the sea or of a lake; or they may have solidified from a molten state (the igneous rocks); or again, they may be either sediments or igneous rocks which have been involved in movements of the earth's crust, and so subjected to great pressure or heat that important adaptations to their new environment have been brought about. The rocks which have been altered in this manner we call metamorphic.

Now, if any rock of these three classes be brought, as they have been brought by geological processes, to the surface of the land in Rhodesia to-day, they at once come into a new environment, and are subjected to a new set of climatic factors.

It is scarcely necessary to point out that the climate, if you will permit me to use the word in this way, at the bottom

of the sea, or of a lake, or the climate of a molten granite mass, is quite different from that of Rhodesia. Rocks, or the minerals of which they consist, formed under one of the former conditions, are not necessarily stable under the latter. No rock mass of any size is stable in an ordinary climate. It is not in harmony with its surroundings. If not attacked chemically by rain-water, which is practically a weak solution of carbonic acid, it is disintegrated mechanically by the alternations of heat and cold, wet and drought. The chief products of the action of the atmosphere on the rocks are the sub-soils and soils. The sub-soil generally represents a first stage in the interaction between the climatic elements and the rock; the soil, a further change largely assisted by the activities of the vegetation. By looking at the soils from this point of view, we shall be able to understand much that at first appears most puzzling.

In the paper that I referred to, Cameron warned us that the Rhodesian soils would not fall into any classification given in the text-books, and that it was necessary in this country to make a fresh start based on experience. The reason for this warning is not far to seek. The majority of text-books of that period dealt with the soils of temperate climates. So far as they dealt with the origin of soils, they discussed the effects of a so-called temperate climate on the rocks. The advances made in soil investigation in the years that have elapsed have enabled this defect to be remedied, and the soils of Rhodesia would find a place in any broad scheme of classification. Their characteristics are not purely local, but are reproduced in the soils of other tropical lands. Let us glance briefly at the distinction between a climate like that of Rhodesia and a so-called temperate climate so far as their actions on the rocks are concerned. In referring to these actions I have already implied that they might be divided between two classes: (1) decomposition, meaning by that the chemical dissolution of the minerals forming a rock, and (2) disintegration, which implies the mechanical breaking down of a rock mass into smaller particles, each of which are themselves either pieces of rock or of the minerals composing the parent mass.

Taking disintegration first, one of the most potent factors

in breaking rocks down in extreme northern and southern climates is frost, which acts by the expansion of freezing water in the joints and the breaking away of blocks of rock in the ensuing thaw.

Although frost is prevalent all over the high veld, its action is negligible, because in the winter months the rocks near the surface are dry and hold no water in their crevices. Consequently, we never see in Rhodesia the banks of screes and huge talus slopes masking the bases of cliffs and steep slopes, which are so characteristic of countries visited by frosts during wet weather. Few fragments of rocks of a size to make pebbles come into our river beds, and thus very little gravel is found along our river banks.

As regards decomposition, the higher temperature we experience undoubtedly promotes chemical action. The great agent of decomposition is rain-water, charged as it is with carbon dioxide and oxygen dissolved from the air. The chief constituents of the igneous and metamorphic rocks, felspars, hornblende, mica, etc., are decomposed, and their more soluble parts, such as the alkalies and alkaline earths, are carried off in solution in the water, whilst the less soluble alumina, silica and iron remain to form clay-like soils composed of aluminium silicates generally coloured by iron salts. Should there be in the original rock any mineral like quartz, which is practically insoluble, it remains in the soil in grains, producing, according to its size and abundance, a sandy or gritty clay or loam. *The characteristic feature of soil formation in Rhodesia is that chemical decomposition is predominant, whilst mechanical disintegration is less active than in a so-called temperate climate.* We shall see how this explains many of the peculiarities of Rhodesian soils.

In any classification of soils which takes any account of their origin, there are always two great divisions. A soil may lie upon the rock from which it was derived, or it may have been transported by river, wind or glacier, and deposited on some other rock.

In the former class the soil is a residue left after certain of the more soluble parts of the underlying rocks have been

carried off in solution. Such soils are often called residual accumulations. The latter class comprises the transported soils, and their character is independent of the nature of the underlying rock.

The chief transported soils are river-borne soils or alluvium. Soils due to wind action are common in desert regions, but it is doubtful whether any of any importance exist in Rhodesia. Soils derived from glacier-borne materials are common in N.W. Europe and N.E. America, but are altogether wanting in Rhodesia, and need no further consideration here. The soils derived from river-borne material or alluvium may be gravelly or sandy, loams or clays. I have given you already a reason why there is so little gravel along our river courses, but as the supply of finer material to form sands, loams and clays is abundant, the same reason does not explain the scarcity of river terraces, which form such important agricultural lands (call them holms, leas, haughs, or what you will) in many countries. A person accustomed to investigate soils in other countries seeks information about the nature of the rocks in the whole of the catchment area above the place he is investigating, and from this information expects to gain a knowledge of the nature of the soil. Such a method of investigation is useless in this country. Time after time it is possible to trace the junction between formations, such as granite or the greenstone schists, across a plain from the hills to the very bank of a large river by the sharp change in the character of the soils. Nothing could make it clearer that most of the Rhodesian soils are residual accumulations. The reason for the scarcity of alluvium is due partly to the nature of the rainfall, and partly to the configuration of the country. The configuration of the country is such that the rivers, rising on a gently rolling plateau, have not steep gradients near their sources. As the plateau breaks away at a varying distance on either side of the watershed, the gradient of the streams increases rather than diminishes, and the rivers seldom have any occasion to deposit their load of silt or mud. The rains, coming as they do in torrential downpours, scour the surface with sheets of water, which, charged with soil, are poured suddenly into the stream courses. The river channels quickly become brimful of rushing, muddy water; but, the supply being suddenly cut off, the floods

quickly subside, and can deposit but little alluvium, and this is likely to be swept away by the following floods. In the dry season the streams are fed by clear spring water, and again no alluvium is deposited. This subject belongs rather to a study of the life-history of the rivers, or to a scientific study of the scenery, than to an investigation into the origin of soils, and I shall not enter further into it beyond pointing out that the scarcity of alluvium in the country is reflected in the gold returns by the very small output of alluvial gold. The scarcity of alluvial deposits has been noticed by mining men from the earliest days of the occupation. On the other hand, the prospector finds "shed gold" in every gold belt. "Shed gold" can be reckoned amongst the minor constituents of our residual soils.

There is one very important kind of soil in Rhodesia, the black vlei soil, which is frequently regarded as alluvium. This I hope to shew you is a mistake, but I shall defer consideration of it until some of the other important kinds have been described.

It is somewhat hazardous to attempt a classification of soils, or even of residual soils alone. When one considers the enormous variety of rocks, and when one remembers that a certain rock may weather in different ways (giving rise to different products in the soil) according to its position—whether, for instance, it is exposed on a dry hill-top or is buried under a vlei—it seems a hopeless task to attempt a classification.

Ignoring the multitude of minor variations recognised by the farmer, the chief soils, viz., those which cover the widest area and at the same time have the greatest agricultural importance, may be grouped under four heads, as follows:—

(1) The Red Clay soil of the metamorphic rocks or formation.
(2) The Granite soil.
(3) The Sandy soil of the sandstone areas.
(4) The Black soil of the vleis and plateaux.

There are many others of agricultural importance locally, but of limited distribution, and these may be mentioned subsequently.

The Red Clay Soil.—This soil occurs from end to end of Southern Rhodesia. It is the characteristic soil of the gold belts, being derived from the group of rocks called Greenstone schists. This group is the most abundant and widely-spread one of the whole metamorphic series which is popularly known in Rhodesia as "formation." Bulawayo, Gwelo, and the higher parts of Salisbury above Cape Avenue are built upon it, and it is hardly anywhere better seen than in the suburbs of Bulawayo. If we dig through this red clay soil we usually find it to be of any thickness, from a few inches, up to six, or even more feet. Below it changes very rapidly and irregularly into a yellowish-brown clay, which may be only an inch or two thick; and this also changes along an irregular plane into decomposed rock, which is generally brownish at first but becomes greener and greener as the depth increases, until at last we come to a hard, greenish or bluish rock, consisting largely of hornblende and felspar. The alteration to yellowish and brownish clayey material is the kind of alteration which these rocks undergo in a temperate climate. The further alteration to a red clay is characteristic of the tropics. In order to shew the nature of the change which takes place, I have here an analysis of a fresh greenstone and of the red clay derived from it. I am sorry that I cannot give you an example from Rhodesia. This one is from Virginia.†

	Fresh rock.	Red clay.
Silica (SiO_2)	46·75	42·44
Alumina (Al_2O_3)	17·61	25·51
Iron sesquioxide (Fe_2O_3) ...	16·79	19·20
Lime (CaO)	9·46	0·37
Magnesia (MgO)	5·12	0·21
Potash (K_2O)	0·55	0·49
Soda (Na_2O)	2·56	0·56
Phosphoric acid (P_2O_5) ...	0·25	0·29.
Loss on ignition	0·92	10·92
	100·01	99·99

It will be noticed that whereas the alumina, iron oxide

† Merrill, G. P., *A Treatise on Rocks, Rock-Weathering and Soils*, p. 207. New York, 1906.

and water have increased relatively, the lime, magnesia and soda have been almost entirely removed. This is a good example of the process of chemical decomposition with little or no disintegration, by which the more soluble alkalies and alkaline earths are carried off into the waters underground, and thence partly back into the streams. The lime is the constituent that is carried off in greatest quantity, and its subsequent history may be followed. If you go down a mine in a country of these greenstones with a red clay soil, and look over the deserted cross-cuts into which water is entering, you will almost certainly find stalactites and stalagmites forming. The lime, and probably some of the magnesia, which was dissolved near the surface in the process of formation of the red soil is being deposited again in depth; and in hilly greenstone country the streams frequently deposit calcareous tufa or travertine at the small waterfalls in their courses. These deposits are often the source of our commercial lime. Knowing that the greenstones are fairly rich in lime (8 to 10 per cent.), it is easy to fall into the mistake of supposing that the red clay soils derived from them are also rich in lime, but such is not the case.

The Granite Soil.—What is usually understood by granite soil in this country includes the soil on the gneisses, and since the gneisses have a composition very similar to that of the granites, the soil derived from them is clearly similar. These rocks are of a grey colour, and the soils are white, or perhaps buff or pale pink. As a rule neither granites nor gneisses in Rhodesia are rich in mica or hornblende, the most abundant constituents being the felspars and quartz. The felspars decompose, first of all, to a fine aggregate of mica (hydrated forms such as serioite and paragonite), and then to a clay which probably consists mainly of very finely divided micaceous matter. Because the decomposition of granite was first investigated in Devon and Cornwall, the text-books make much of the formation of kaolin from granite. But the production of kaolin is not the usual result of the decomposition of felspar, and I am not at all sure that it is formed anywhere in Rhodesia. The quartz is set free by the decomposition of the felspar, and remains in the soil in angular grains of varying size. Hence the granite soils always feel gritty.

MECHANICAL ANALYSIS OF GRANITE SOIL.

Average of 10 Samples.

(Government Agricultural Laboratory, Salisbury.)

Coarse gravel, over 3 millimetres	1.04
Fine gravel, 1 to 3 mm.	10.15
Coarse sand, 0.2 to 1 mm.	39.51
Fine sand, 0.04 to 0.2 mm.	25.79
Silt, 0.01 to 0.04 mm.	7.61
Fine silt and clay, under 0.01 mm. ...	11.69
Water and organic matter	4.29
Calcium carbonate	0.01

Thus we see that the formation of a granite soil is primarily due to decomposition, but it is not so complete as in the case of the red clay soils. Mr. G. N. Blackshaw, the Government Agricultural Chemist, has kindly given me the figures of the mechanical analysis of ten samples of granite soil used for the cultivation of Virginia tobacco. The average of these analyses shews clearly that the granite soil is one of mixed grain, no one size occurring in great preponderance (see analysis).

The Sandstone Soil.—The sandstone soil is derived from the sedimentary beds of Karroo age, and chiefly from the uppermost member of the sedimentary series, the Forest Sandstones. The sandstones are found covering a wide area in Matabeleland north of Bulawayo, and it is in this area that these soils have their chief agricultural importance. Wind and water have played their parts in the formation of the sandstone, which consequently consists of rounded grains of a fairly uniform size in any particular bed. Most of the grains consist of quartz, mixed with a small proportion of felspar grains. The felspars have decomposed to clayey matter which acts as a lightly binding cement. In other parts the cementing material is oxide of iron; in others again opal or some other form of silica. But whatever the cement may have been, it has yielded to the solvent action of atmospheric waters over many sandstone areas, and the surface now consists of a deep layer of quartz sand. In this case

there is very little decomposition, but, such as it is, it is of great importance in the formation of the soil. For the following average of the mechanical analyses of eight samples of sandstone soil I am again indebted to Mr. Blackshaw. The figures shew how 91 per cent. of the soil consists of grains which fall into the two sizes of sand grains. The decomposed felspar grains are represented by the 5 or 6 per cent. of clayey matter.

MECHANICAL ANALYSIS OF SANDSTONE SOIL.

Average of 8 Samples.

(Government Agricultural Laboratory, Salisbury.)

Coarse gravel, over 3 millimetres	*nil.*
Fine gravel, 1 to 3 mm.	0.25
Coarse sand, 0.2 to 1 mm.	30.49
Fine sand, 0.04 to 0.2 mm.	60.92
Silt, 0.01 to 0.04 mm.	1.04
Fine silt and clay, under 0.01 mm. ...	5.38
Water and organic matter	1.88
Calcium carbonate	0.01

The Black Soils.—We now come to the black soils, of which the chief is "black vlei soil," well known for its fertility. It covers the floors of our vleis throughout the country, whatever the underlying rock formation may be. It does vary, however, with the nature of the rocks beneath it, being sandy or gritty on granite, and a stiff clay on the greenstone schists. The farmer, of course, makes an important point of these differences.

It is extraordinary what a number of mistaken notions about this soil one encounters. Sometimes it is said to be peaty, presumably because it is black, but this is an error of observation. A very slight examination shews it to be a clay, and analyses which Mr. Holborow, the Government Chemist, has kindly supplied, confirm this. There is nothing in our vleis approaching peat, except where a reed bed has been cut down and drained, and the soil here is quite different from black vlei soil.

CHEMICAL ANALYSIS OF BLACK VLEI SOIL FROM RUTHERFORD FARM, SHAMVA.

(No. 368, Government Agricultural Laboratory, Salisbury.)

Soluble in conc. HCl, digested for 48 hours on water bath.

Silica and refractory silicates	59·17
Ferric oxide and alumina	18·57
Lime (CaO)	1·00
Magnesia (MgO)	0·76
Phosphoric oxide (P_2O_5)	0·093
Potash (K_2O)	0·092
Loss on ignition (water and organic matter)	20·58
Nitrogen	0·29

Soluble in 1 per cent. citric acid solution.

Phosphoric oxide (P_2O_5)	0·007
Potash	0·025

Analysis shews that the vlei soil is not really rich in humus or decayed vegetable matter, though it is richer in it than the red clay, granite or sandstone soils. The colour is sometimes put down to the blackening effect of veld fires, but this is absurd, for until lately grass fires have swept annually over the red clay, white granite and yellow sandstone soils without perceptibly changing their colour.

In speaking to you of the transported soils I have referred to the fact that black vlei soil is often described as alluvium, and some of the statements I have just made may appear to support that view. Now black soil is not confined to vleis; it is found on the flat tops of the tabular hills in the country north of Bulawayo, lying there upon the level basalt lavas. This we may speak of as black plateau soil. It possesses the same characteristics as the black vlei soil. In the rains it becomes soaked with water and almost impassable because of its stickiness; in the dry season it slowly dries up and shrinks, becoming seamed with deep and widely open cracks, and lastly, it is usually treeless, or at most, only thorn bushes grow in it.

Further, these black soils have a very wide distribution.

In Africa they extend from the Transvaal, through Rhodesia and East Africa right into the Soudan, whilst there appear to be representatives in the Nigerian Uplands of West Africa. In India, the "regur" or black cotton soil seems to be a surface accumulation of a similar nature. Any explanation of the Rhodesian black soils must also be consistent with an explanation of the origin of the black soils of other countries.

I put forward a simple working hypothesis based on the following facts of observation. Black soils are found in countries in which there is an alternation of wet and dry seasons. They are found in those positions in which the natural sub-surface drainage is poor, due to a relatively impervious rock floor and to the conformation of the ground preventing the water draining away readily. At the end of the rainy season the ground is waterlogged, or nearly so; and in the ensuing dry season much of the ground water is lost by evaporation. Wherever these conditions obtain, even in a vlei in which the whole of the catchment area is covered by red soil lying on greenstone schists and without change of formation, there you will find black soil.

This soil remains full of water for a sufficient length of time in the wetter parts of the country to allow the natives to cultivate rice by digging shallow pits in the black soil. It is no doubt this excess of water during the rains that prevents the growth of any trees except a few thorn trees. It is, I believe, well known among botanists that certain plants which are adapted to resist a drought can also live in such swampy conditions that ordinary plants would be drowned, owing to the waterlogging of the soil and the exclusion of air from access to their roots. This condition may apply to the thorn trees occasionally seen in the thinner parts of a black vlei.

The loss of water by evaporation from the black soils at the beginning of the dry season has some interesting consequences. In discussing the origin of the red clay and granite soils we saw that certain salts, particularly lime, magnesia, potash and soda, were dissolved from the decomposing rocks. Lime and magnesia are quickly precipitated from a solution undergoing evaporation, and this fact will readily explain the constant presence of small nodules of white limestone scattered

throughout the black soils. Occasionally these nodules become very abundant and even unite to form a bed at the edge of and beneath the black soil. I have noticed that the origin of these deposits of vlei limestone, which are frequently valuable sources of lime, is a puzzle to many. I remember a case where two farmers, having noticed these nodules of limestone in a vlei, set up a diamond drill on the top of the neighbouring rise, and bored through fifty feet or so of very hard rock, in the expectation of finding a bed of limestone at the level of the vlei. It is almost unnecessary to say that their money was spent in vain. Again, it is remarkable how persistent is the idea that the nodules of vlei limestone indicate the existence of a body of limestone in the neighbourhood. Of course, you can see that it does no such thing, and nothing can make this clearer than the presence of this limestone in vleis lying wholly within a granite country. Rhodesian granites always contain a large percentage of soda-lime felspar, generally oligoclase, which contains 3 to 5 per cent. of lime; and other less abundant constituents such as biotite, hornblende and sphene also contain lime. There is no doubt that sufficient lime is set free from a decomposing granite to account for the limestone nodules in granite vleis.

Vlei limestones always contain some magnesium carbonate, and occasionally a considerable percentage. It has an origin similar to that of the lime carbonate. It is not always the case, however, that the carbonates of magnesia and lime are precipitated. Under some conditions, hydrated oxide of iron is deposited in the soil in rounded grains of limonite about the size of buckshot. In some places these become cemented together to form large blocks, or even an irregular bed or pan beneath the soil. This surface ironstone is rather widely known under the Dutch name of "oude klip," which is somewhat of a misnomer, seeing that it is one of our youngest rocks and is probably being formed in many vleis at the present day. What is frequently forgotten, and this remark applies equally to the vlei limestones, is that where a natural exposure of these beds is seen, erosion has cut down into the vlei soil and the formation of ironstone or limestone has already ceased.

It is quite likely that on the drying up of a vlei in the dry seasons, some of the potash and soda salts are also precipitated

in the soil, but as they are still in a soluble form, they are dissolved and carried down by the next rains. They do not accumulate, but remain in circulation. It is one of the dangers in the irrigation of the black soils, that these salts are liable to be brought to the surface in excess. Should this happen, infertility is the certain result.

A great point of difference which has not been mentioned before, between the soils of the tropics and of the temperate regions, is that humus does not accumulate in tropical soils. This is the reason for the fact that there is so little difference between our soils and sub-soils, as Cameron has already remarked in his paper. Owing to the fact that the black soils are soaked in water for a portion of the year, humus is able to accumulate in them to a greater extent than in the other soils. To this, and to the circulation of salts mentioned just now, the continued fertility of the black soils for many years without manuring is doubtless to be attributed. They have special powers, as it were, of renewing their supplies of plant food.

Having discussed the chief types of soil in some detail, I will now refer very briefly to a few of the less widely distributed or less abundant types.

A kind of red clay, which I have not yet mentioned, is that lying on the Great Dyke of Southern Rhodesia. The Great Dyke is a belt of rocks, some four miles in width, which runs across the country for 300 miles from the Umvukwe Hills in the north to the Doro Hills in Belingwe. Many of the rocks of this belt, being what are called ultra-basic, are particularly rich in magnesia, amounting in some cases to as much as 35 per cent. As a consequence, the red clay soil on the slopes and the black soil in the hollows has so much more magnesia than lime as to cause injury to crops and seriously to reduce the fertility of the soils. The "vlei limestones" of these areas consist largely of magnesium carbonate instead of the lime carbonate of the greenstone schist and granite areas.

As a variety of the granite soils, we have the felsite soils, which may be described as pale-coloured loams, in some places more clayey, in others more sandy. The parent rocks consist chiefly of felspar and quartz. As in the case of the granites,

the felspar decomposes to clayey matter, but the quartz, being in smaller grains, does not give rise to a gritty soil. The largest areas of these soils that I have seen are in the middle Mazoe valley and in Enterprise. They are described as rather cold soils, and not remarkable for their fertility.

In the Somabula Forest there is a large stretch of white sand soil overlying sands and gravels containing a considerable supply of water. The agricultural capabilities of this soil do not appear to have been tested. Yet another soil, about which little is known, is the red sand which forms the sand bults in the western parts of the Wankie District.

Before concluding I must refer briefly to a subject which I omitted at first in order to prevent confusion. I have tried to shew you that our soils are mainly the result of decomposition of rocks, and that clayey matter consisting of hydrated aluminium silicates is the chief product of that decomposition. In equatorial regions it is common to find a further stage of decomposition taking place, by which the silicates are broken up, and oxides and hydroxides are produced. The characteristic product is laterite, and the process is called lateritisation. This further change is perhaps of more importance in the mineral development of a country than in its agricultural development, for it occasionally happens that local conditions favour the concentration of one of the oxides or hydroxides, and such concentrations may form valuable mineral deposits. The chief ore of aluminium, bauxite, is produced, or has been produced in past geological ages, in this way. Much manganese ore is obtained from the lateritic deposits in India, and the iron hydroxide concentrates sometimes become of economic importance.

That this more complete decomposition does take place in Rhodesia to some extent is shewn by the discovery near Selukwe of a felsitic sub-soil containing over 49 per cent. of alumina. Mr. Blackshaw has reported an abnormal soil containing so high a percentage of manganese that it caused injury to certain crops, though the quantity is insufficient to make it an ore. The surface ironstones which I have described as being found in association with the black soils have frequently been called ferruginous laterite, but it seems to me that this name is somewhat misleading and gives the impres-

sion that lateritisation has gone on in Rhodesia to a greater extent than the evidence warrants.

Whilst endeavouring to interest you in a subject which has little to recommend it in attractiveness, I hope I may at least have succeeded in helping to solve some of those puzzles which come to those who notice the peculiarities of our soils. Some statement such as I have attempted seems necessary, for in a recently published text-book we read the astonishing statement, "The whole country is covered with superficial deposits either of concretionary limonite or *ou klip*, or of Kalahari sand with its accompanying calcareous or siliceous tufa." Rhodesia all Kalahari sand and *ou klip*! What an outlook for the farmer and prospector!

From a broader point of view it surely requires no effort of imagination to see that exact information about our soils must be of material assistance in that rapid and efficient agricultural development of the unoccupied portions of the Territory that we all desire. Were we a more practical people, we should have collected and systematised that information years ago. It would have been made available for the settler, and it would have had its place in any scheme for the development of the land that may have been adopted.

Agricultural Union Congress

The annual Congress of the Rhodesia Agricultural Union has been fixed to open at Umtali on Thursday, 8th March.

Beef Feeding Experiment No. 3,

GOVERNMENT EXPERIMENT FARM, GWEBI.

By R. C. Simmons.

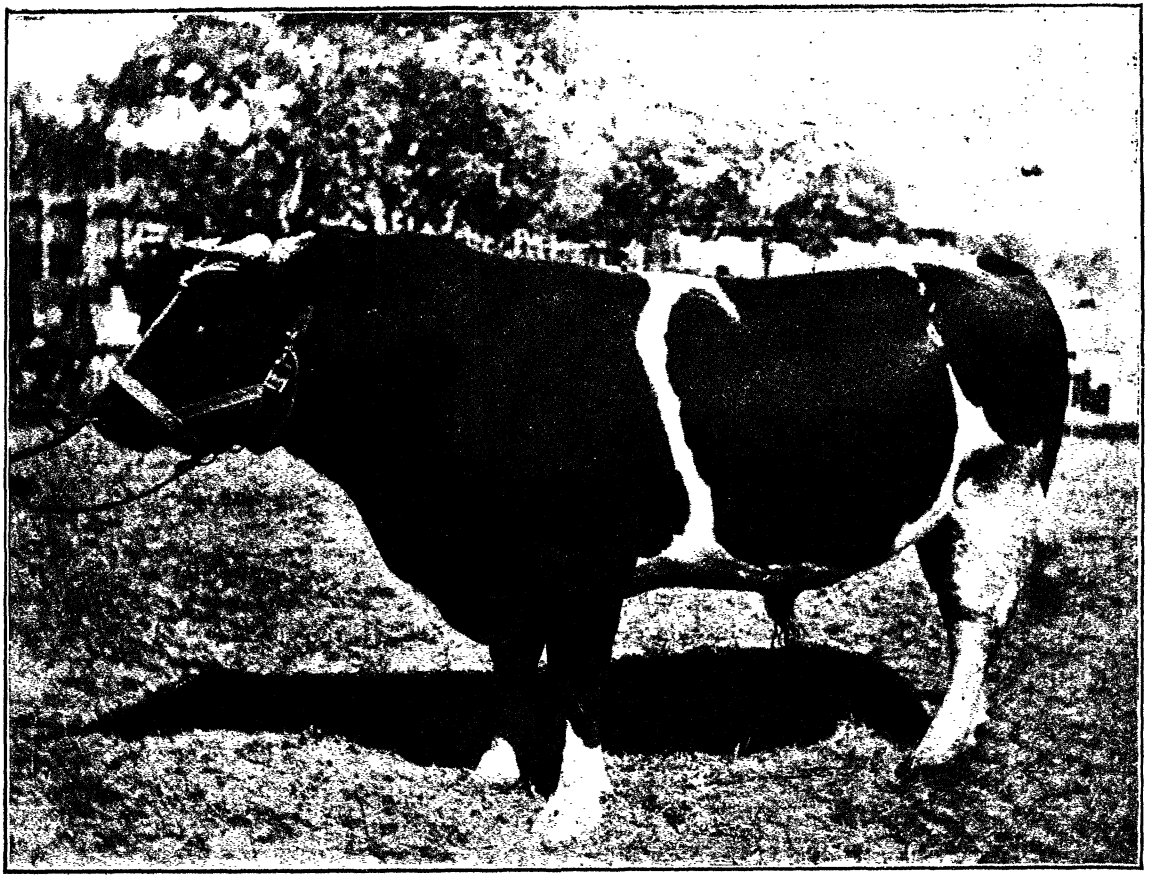
Following on experiments Nos. 1 and 2, details of which were published in the *Agricultural Journals* for February and October, 1916, a further feeding trial has been made with the object of ascertaining the feeding qualities of old trek oxen and of comparing their feeding value for local trade with that of younger and untrained oxen.

For this purpose eight oxen were chosen which had up till that time been continuously at work, and which shewed abundant signs of exhaustion, and were in fact unfit to continue in the team. They were all over eight years of age, and were of a large framed type of grade animal commonly found in Matabeleland, shewing traces of Shorthorn, Friesland and Afrikander blood.

At the same time there were selected eight oxen, comprising four half-bred Shorthorn-Angoni and four half-bred Aberdeen Angus-Angoni, bred by Messrs. Dimmock & Rawson, of Darwendale, untrained and having from four to six teeth up at the commencement of the trial. They were of excellent quality, but, as is usually the case with half-bred Angoni stock, they lacked size of frame.

Both lots were yarded, the young bullocks on 5th August, and the older oxen on 9th August, and fed entirely in the yard until 21st December, when they were sent into Salisbury and sold.

Owing to the fact that neither lot could be disposed of when, in the judgment of those concerned, it would have been



Mr. J. T. English's Friesland Bull "Jan Smuts." Winner of Championship, Umtali, 1915 and 1916.

most profitable to do so, the experiment has unfortunately lost some of its value. It is probable that the younger bullocks would have shewn a greater profit had they been marketed a month earlier. In the case of the older bullocks the amount of manure made in the last month compensated somewhat for the cost of the long period of feeding, which also was regarded as longer than was necessary.

The feeds used and the cost price of production at which they were charged to the bullocks were as follows:—

Crushed maize	£0	4	0	per bag.
Veld hay	0	7	6	per ton.
Velvet bean hay	0	14	0	,,
Majorda melons	0	5	0	,,
Maize ensilage	0	10	0	,,
Oat straw	0	5	0	,,
Teff hay	0	12	6	,,
Mangels	0	12	0	,,
Sweet Potatoes	0	10	0	,,

The approximate daily feed from time to time was as shewn in the accompanying table of rations:—

RATIONS FED TO LOT 1 (Old Trek Oxen).

Period.	Crushed maize.	Veld hay.	Ensilage.	Majorda melons.	Mangels.	Velvet bean hay.	Teff hay.	Oat straw.	Sweet potatoes.	Total grain.	Total hay and roughage.	Total succulents.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Aug. 9 to Sept. 1 -	9·0	13·5	22·8	5·1	...	...	...	...	...	9·0	13·5	27·9
Sept. 2 to Sept. 29 -	12·6	11·2	23·2	11·4	...	...	...	...	0·9	12·6	11·2	34·6
Sept. 30 to Oct. 27	13·0	11·2	18·7	18·7	...	...	...	1·6	1·5	13·0	12·8	38·9
Oct. 28 to Nov. 24 -	13·0	11·2	18·7	18·7	...	...	...	0·8	...	13·0	12·0	37·4
Nov. 25 to Dec. 15 -	13·0	11·2	18·7	18·7	...	...	...	...	...	13·0	11·2	37·4

RATIONS FED TO LOT 2 (Young Untrained Oxen).

Aug. 5 to Sept. 1 -	9·1	6·2	14·6	2·1	...	1·8	...	...	...	9·1	8·0	16·7
Sept. 2 to Sept. 29 -	12·0	5·6	16·0	13·3		2·5	...	...	...	12·0	8·1	29·3
Sept. 30 to Oct. 27	12·0	5·6	16·7	18·7	...	0·8	...	1·6	...	12·0	8·0	35·4
Oct. 28 to Nov. 24 -	12·0	6·7	16·7	18·7	...	...	...	0·8	...	12·0	7·5	35·4
Nov. 25 to Dec. 15 -	12·0	3·6	16·3	16·1	2·0	...	5·9	...	...	12·0	9·5	34·4

Note.—With the exception of the maize, the feeds used were the cheapest possible.

It will be noticed that only very small quantities of the more expensive fodders such as velvet bean and teff hay were used.

The weights of the two lots were as under:—

Lot 1.—*Old Oxen.*

Total live weight at commencement of experiment	8,020 lbs.
Total live weight at end of experiment	9,425 ,,
Total gain in live weight	1,405 ,,
Total dead weight	5,719 ,,
Percentage of carcase to live weight	60.6 p. cent.

Lot 2.—*Young Oxen.*

Total live weight at commencement of experiment	6,125 lbs.
Total live weight at end of experiment	8,240 ,,
Total gain in live weight	2,115 ,,
Total dead weight	4,580 ,,
Percentage of carcase to live weight	55.5 p. cent.

Note.—The percentage of carcase to live weight is exceptionally low for this class of bullock. There was no apparent reason to account for it.

The financial results were as follows:—

Lot 1.—*Old Oxen.*

Original value of oxen at £5 per head	£40	0	0			
Interest on £40 at 6 per cent. per annum for 4 months	0	16	0			
Cost of food for 129 days	22	3	2			
Cost of marketing at 2s. 6d. per head	1	0	0			
Cost of labour of feeding (approx.)	1	6	0			
Sale price of oxen at £10 per head ...				£80	0	0
Value of 30 tons of manure at 5s. per ton				7	10	0
To balance—excess of income over expenditure	22	4	10			
	£87	10	0	£87	10	0

Note.—These oxen were working on the farm and were sold by private contract delivered in Salisbury. No expense, therefore, was incurred in obtaining them, and the marketing costs were railage only.

Lot 2.—Young Oxen.

Value of oxen at commencement of experiment	£60	0	0			
Cost of railage to the Government farm at 2s. 6d. per head	1	0	0			
Interest at 6 per cent. per annum on £60 for 4 months	1	4	5			
Cost of feeding for 133 days	20	3	11			
Labour of feeding (approx.)	1	6	0			
Cost of marketing at 2s. 6d. per head	1	0	0			
Sale price of oxen at £2 per 100				£91	12	0
Value of 20 tons of manure at 5s. per ton				5	0	0
To balance—excess of income over expenditure	11	17	8			
	£96	12	0	£96	12	0

Note.—These oxen were also sold by private contract, thus eliminating commission on sale, etc.

The indications of this experiment are:—

1. That under more regular marketing conditions it will probably pay handsomely to feed aged trek oxen, especially if they are fed before they are too old.

2. That the amount of maize used is greater than is commercially sound at its present price, and that although a small ration may be necessary in any case to supplement our commoner foods, it is essential that further trials should be conducted with a view of ascertaining the best methods of producing good beef on a small ration of maize.

Such further trials are being arranged.

Notes on the Returns of Crops Harvested in 1916.

By Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred Eyles, F.L.S., Statistician.

In the December issue of this *Journal* we published a statement regarding the crops harvested last season, shewing the total acreage in every district for maize, kaffir corn, sunflowers, ground nuts, beans, tobacco, potatoes, wheat and oats, indicating also the total crop and the quantity kept for home use. In the case of the three last mentioned crops, we further separated the summer grown crops from those grown in damp vleis or under irrigation in the winter. Of certain other crops, which are mainly consumed on the farm, only returns of the acreage were asked for, and in the case of citrus fruits the number of trees was considered a better guide than the extent of the orchards.

A scrutiny of the information thus collected has now been made, and certain instructive and interesting results obtained. The principal facts had to be made public at the earliest possible moment in order to give, not only producers, but merchants and consumers alike, an idea of the actual available stocks in the country, and to guide farmers in their preparations for further planting next season. We would commend the accompanying tables and maps to careful study by farmers, particularly with regard to the data of their own districts and comparison of their own conditions with those of other parts of the country. The analysis we attempt below brings out the more prominent facts, but it would be useful for farmers to ascertain how far the facts and figures affect their own particular case.

It is of special interest to ascertain the pre-eminence of

different districts, and this is brought out in Table No. II., shewing the distribution of crops in the different districts of Rhodesia by the acreage planted to each. The total area under all crops for which returns were asked, embracing practically all the crops grown in the country by Europeans, is 202,946 acres, which, divided over the number of farmers working last year—1,595—gives an average of 127.24 acres per farmer. For the total of cultivated land the palm goes to Mazoe with 46,282 acres, Salisbury being second with 42,332 acres, and Hartley third with 21,269. The amount of land devoted to maize in comparison with that under all other crops is remarkable. The figures for the four chief maize districts are as follows:—Mazoe, 92.7 per cent.; Salisbury, 85.6 per cent.; Hartley, 87 per cent.; and Lomagundi, 93.9 per cent. of all cultivated land. That maize is by far the most widely grown crop of any in Rhodesia is common knowledge, but it will be a surprise to many to find that this crop occupies no less than 86 per cent. of the total cultivated area of the country, the remaining 14 per cent. being distributed over a large number of other crops.

Mazoe also leads in citrus trees with 376 acres, and beans with 609 acres; but its predominance in maize is obtained at the cost of other crops, and it is evident, both from statistics and from actual observation, that there is need in this district for the introduction of crops other than maize if the past returns from the farm are to be maintained. The converse is well brought out in the case of Salisbury, which leads as regards quite a number of side crops, shewing that the principle of a rotation is more advanced, and that mixed farming is more generally practised in this district, as many of these crops are forage crops or oil crops grown largely as a rotation and an occasional change to the soil from the main staple. We thus find Salisbury taking first place for potatoes, 684 acres; pumpkins, 435 acres; majordas, 329 acres; manna, 194 acres; oats, 352 acres; Napier's fodder, 95 acres; dhal, 243 acres; teff, 447 acres; ground nuts, 1,233 acres; and sunflowers, 752 acres. For tobacco Marandellas is an easy first, with 649 acres; in velvet beans Hartley leads, and in hay is a close second to Salisbury, shewing the attention paid there to forage crops for winter use; for wheat Charter is in the van, with Melsetter second; rye is grown more in Makoni than any

other district, and it is interesting to find the high place that Makoni takes in quite a number of different crops.

The leading position of maize has been mentioned. Last year this crop occupied 174,647 acres out of 202,946. Next, though a long way behind, it will no doubt surprise many to find that ground nuts take second place in the country as regards extent of land, with 3,043 acres or 1.4 per cent. of the total cultivated area. Beans come third, with 2,424 acres, equivalent to 1.1 per cent.; then wheat, with 2,051 acres, or 1.01 per cent.; and majordas, with 2,033 acres, or just 1 per cent. of the whole.

A group of crops all of remarkably nearly the same acreage is shewn below:—

Crop.	Acres.	Percentage.
Sunflower	1,766	.87 per cent.
Potatoes	1,757	.86 ,,
Teff	1,746	.86 ,,
Citrus	1,726	.85 ,,
Oats	1,678	.82 ,,
Pumpkins	1,591	.78 ,,

Acreage alone is, however, not a fair measure of value, as obviously, for example, the land under citrus trees has cost much more to prepare and lay out than that under other crops, while potatoes represent a crop of much higher value per acre and involve more work and attention than others. Tobacco, too, represents a high value per acre, although the entire area under this crop only amounts to 1,311 acres, or .64 per cent. of the whole. As yet there is relatively little seen of such crops as manna, dhal, Napier's fodder, velvet bean or rye, but some of these, although of great promise, are only just passing out of the experimental stage, and their importance is not indicated by their mere acreage to-day. It will be interesting in years to come to watch the progress, absolute and relative, of these various crops in the public estimation.

Maize.—Certain facts regarding the maize crop have already appeared above and need not be repeated. We find the principal maize growing districts to be conterminous, thus forming a zone or maize belt consisting of Mazoe, Salisbury,

Hartley, Lomagundi, Gwelo, and to a lesser degree Marandellas and Makoni. (See Map, Diagram I.) Isolated districts in which there are a large number of maize growers are also Bulalima-Mangwe and Melsetter. Although this is so nearly a universal crop that 86 per cent. of all cultivated land is occupied by it, and in one district (Mazoe) 95.5 per cent. of the farmers grow it, yet, taking Rhodesia as a whole, there are 20 per cent. of the farmers who do not touch maize. The total number of maize growers, according to their returns, is 1,276, of whom we find 149 in Mazoe, 141 in Salisbury and 126 in Hartley. If we divide the area under maize by the number of growers, we find there were nearly 137 acres per farm, and the average return per farm was 533 bags last year. Farmers can thus satisfy themselves whether they come up to or fall below the average of the country in this respect. The corrected average crop for the country last year was at the rate of 3.89 bags per acre, a considerable fall from the previous season, and attributable, of course, to the dry spell during the most critical period of the growing season. The highest average is found in the Mazoe district, with 6.5 bags, followed by Salisbury, with 5.1 bags; these average figures are of course much below the actual returns of many farmers, taking into account, as they do, all failures and the better and the poorer soils.

Citrus.—Next to maize, this is the most frequently grown crop, although ranking in acreage below ground nuts and quite a number of other crops. (See Map, Diagram IV.) It is grown by 772, or nearly half the farmers in the country, though by many on only a small domestic scale, as is shewn by the average of about 80 trees, whereas the commercial citrus proposition usually includes several hundred trees. Melsetter shews the highest proportion of citrus growers, Salisbury the actual greatest number, whilst the largest number of trees are found in Mazoe district, and the biggest groves in Mazoe and Umtali districts. A notable feature is the number of trees not yet in bearing—51,896 oranges against 35,071 in bearing, and 20,741 other sorts against 22,106 in bearing. This shews the rapidity with which the industry may be expected to advance within the next few years, as these trees already planted attain the profitable stage. Apart from these there are considerable nursery

stocks being propagated and likely to be planted out during the next few years. Of oranges of all ages there are in the country 86,967, and of other citrus trees 42,847, giving 129,814 trees in all. This is no inconsiderable quantity, and implies that the citrus industry is now a real factor in the economic position of the country, and one demanding attention.

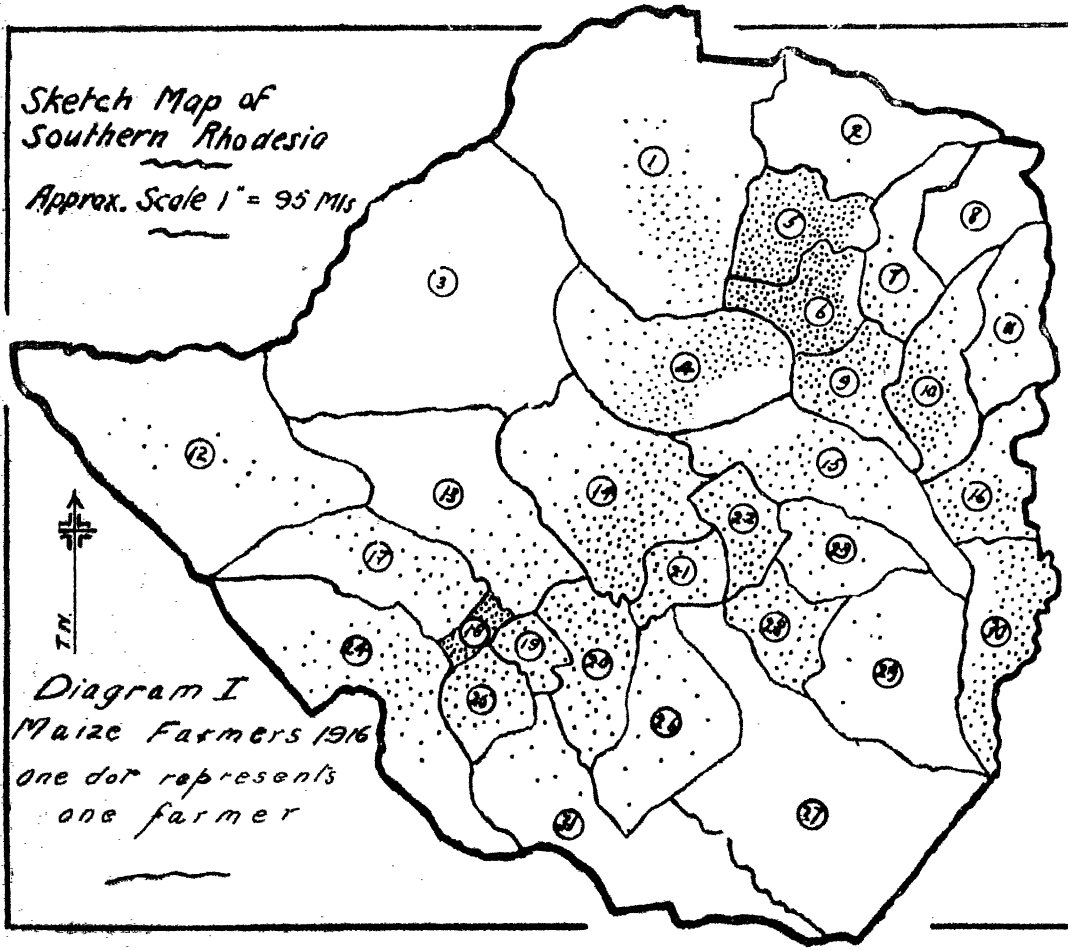
Potatoes.—Examination of the returns shews that about one-third of the farmers of the country grow potatoes. Salisbury and Mazoe are the principal districts, but they are also grown to some extent everywhere. The average return is taken at 20.4 bags of 150 lbs., but this is based partly on estimated returns for winter crops, though no doubt it is not far from correct.

Tobacco.—The number of growers of tobacco last year was 75, of whom 14 in the Marandellas district produced one-half the crop. Melsetter, Salisbury and Hartley districts follow in that order, but elsewhere little tobacco was grown. (See Map, Diagram III.) In Marandellas and Melsetter 15 per cent. of the farmers grow tobacco, but through the whole country only 4.7 per cent. In Marandellas district 9.1 per cent. of the total cultivated area is under this crop, and the average yield was 488 lbs. per acre against 425 lbs. in Melsetter, 439 lbs. in Salisbury and 410 lbs. in Hartley. The average for Southern Rhodesia is 486 lbs. The apparently high yields in a few districts where very small acreages of this crop were grown are no criterion.

Beans.—This crop is well represented in all districts, and is grown by over 25 per cent. of the farmers of the country—402. Only 1.1 of the cultivated area was planted to beans —2,424 acres, and the total yield was 719,508 lbs. The yield is very variable, and in this connection it is curious to notice that in districts where arable farming is well advanced the average return was low, whereas in other districts where less maize is grown the returns are very much better; thus we find the averages as follows:—Mazoe 262 lbs., Hartley 168 lbs., Salisbury 412 lbs. and Lomagundi 395 lbs.; but Melsetter at the head of the list with 655 lbs., Inyanga 628 lbs., Mrewa 561 lbs. and Nyamandhlovu 518 lbs. per acre. None of the higher yields are from the maize belt.

Ground Nuts.—This crop is steadily growing in importance. Besides the market to the mines as boys' food and to the oil factory in Salisbury, there is also a good market at times to the Transvaal, and, under normal conditions, probably to Europe. The value of this food, both roots and tops, as cattle and pig feed, ensures that it is one that can always be utilised in some form or another. It deserves to receive even wider attention. As regards distribution, it is very generally grown, and 3,043 acres were spread amongst 310 farmers, or about one in five of the farmers of the country; in Salisbury, Mazoe, Hartley and Marandellas one-third of the farmers grow this crop. Ground nuts cover the largest acreage of any side crop, though very far behind maize, and yet it is a crop which has only lately come into prominence. In Darwin, with only four farms, the statistics are necessarily exceptional, and 10.5 per cent. of the land is under this crop; in Marandellas 5.2 per cent. and in Salisbury 2.9 per cent. The yield of bags of 83 lbs. gross averages for the whole country 7.4 bags; in Salisbury, with 54 growers, 7.6 bags; in Hartley, with 47 growers, 6.7 bags; in Mazoe, with 52 growers, 9.2 bags; in Marandellas, with 31 growers, 6.1 bags; in Gwelo, with 23 growers, 4.1 bags.

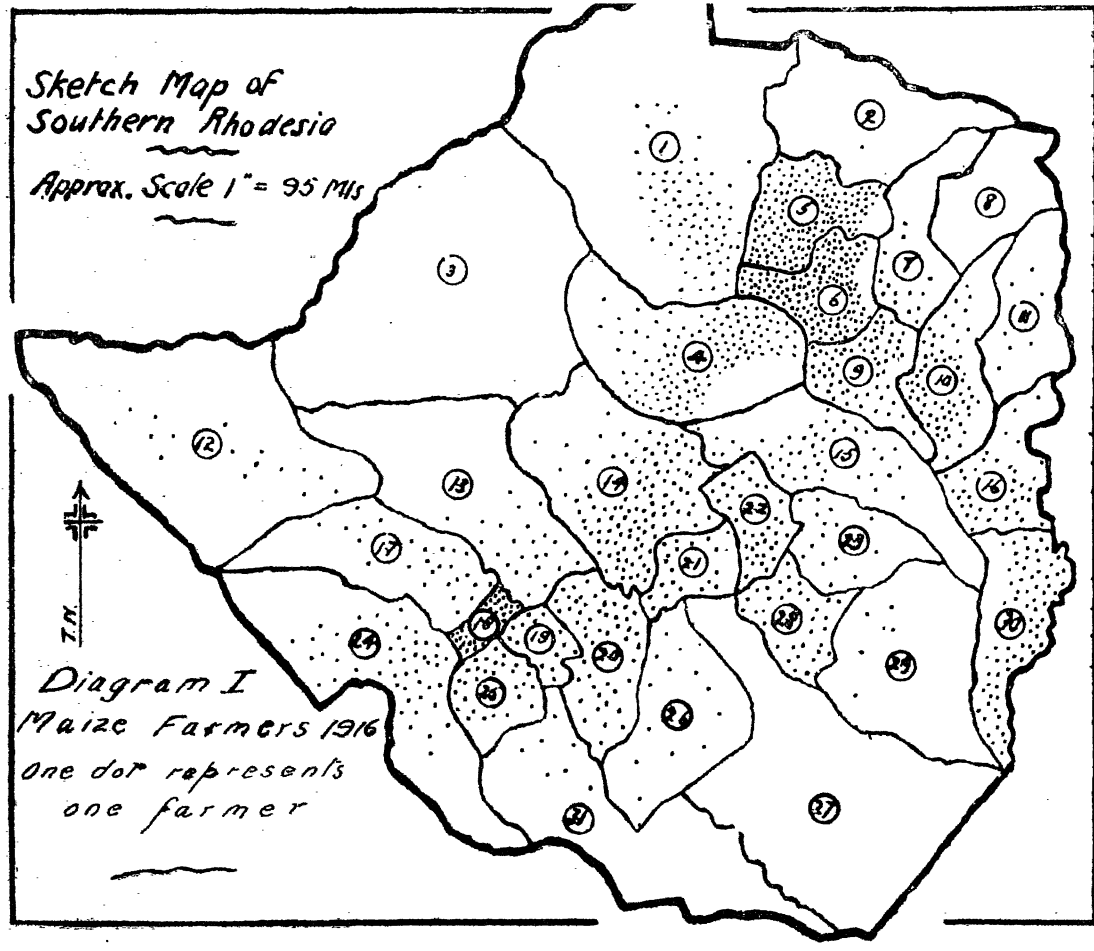
Wheat.—Our production of wheat in 1915-16 was 5,956 bags, about 14 per cent. of our requirements for the year, and the total extent 2,051 acres. The summer wheat sown was 866 acres, and the winter wheat 1,185 acres, a much smaller area than would have been the case but for the exceptionally dry season. In this direction it will be obvious that there is very great room for improvement as regards supplying our local markets, and this crop is recognised to be one entailing relatively less labour than others, and producing, where conditions suit, very remunerative crops. Melsetter is the principal wheat district, with 46 growers out of 79 farmers, and nearly one-fifth of the entire area is under this crop. Charter ranks next, with 18 wheat growers out of 61 farmers, and over 10 per cent. of the cultivated land. Chilimanzi ranks third, and other districts in which wheat is frequently grown are Umtali, Makoni, Marandellas and Victoria. (See Map, Diagram II.) The expansion of the area of summer wheats is a notable feature, and although this crop is largely in experimental stages, we may hope that ere long it will be



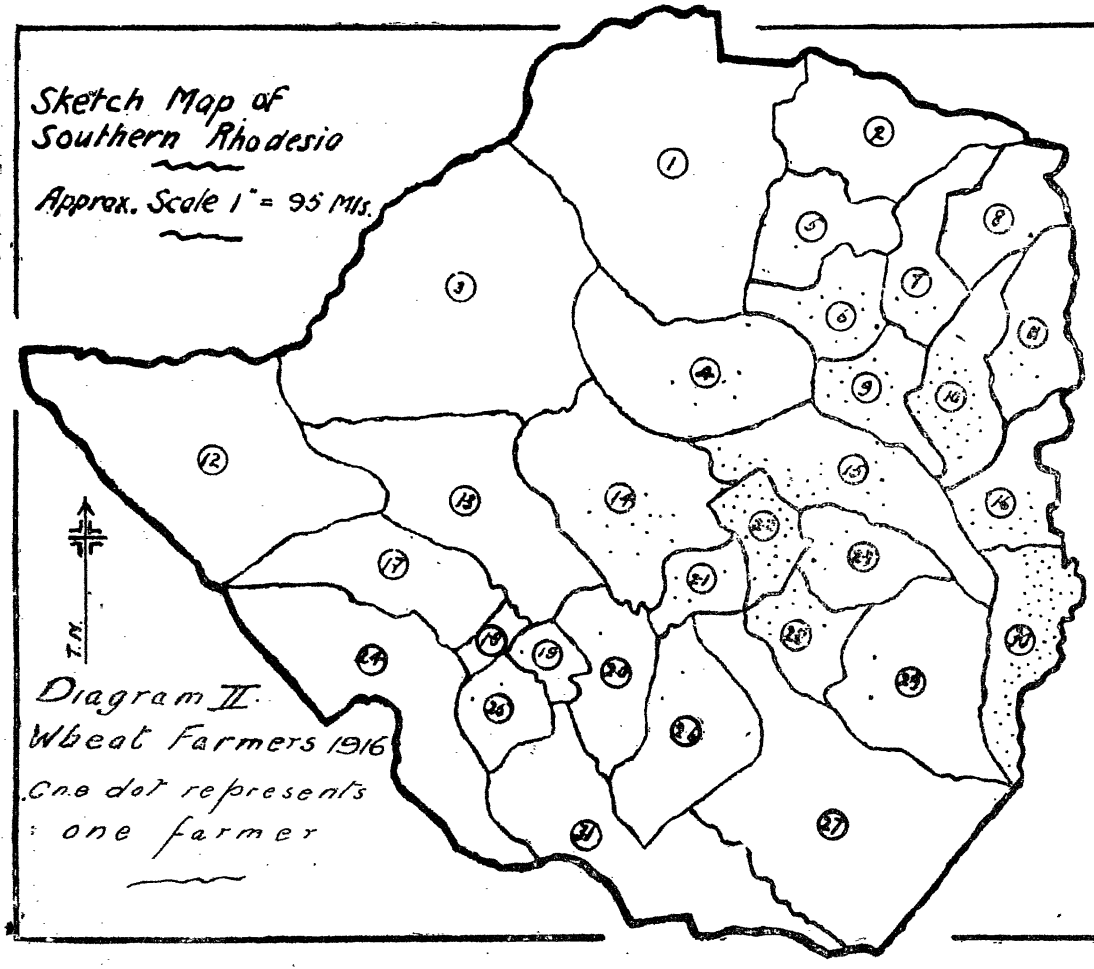
№	District	Farmers
1	Lomagundi	79
2	Darwin	1
3	Sabungwe	0
4	Hartley	126
5	Mazoe	149
6	Salisbury	141
7	Mrewa	15
8	Mtoko	0
9	Marandellas	63
10	Mutoko	61
11	Inyanga	7
12	Wankie	16
13	Bubi	25
14	Gwelo	111
15	Charter	44
16	Umtali	39
17	Nyamandhlovu	26
18	Bulawayo	29
19	Umzingwane	14
20	Insiza	50
21	Selukwe	20
22	Chilimanzi	37
23	Gutu	15
24	Bulalima-Mangwe	48
25	Matobo	29
26	Belingwe	15
27	Chibi	0
28	Victoria	34
29	Ndanga	5
30	Melsetter	70
31	Gwanda	7

Ground Nuts.—This crop is steadily growing in importance. Besides the market to the mines as boys' food and to the oil factory in Salisbury, there is also a good market at times to the Transvaal, and, under normal conditions, probably to Europe. The value of this food, both roots and tops, as cattle and pig feed, ensures that it is one that can always be utilised in some form or another. It deserves to receive even wider attention. As regards distribution, it is very generally grown, and 3,043 acres were spread amongst 310 farmers, or about one in five of the farmers of the country; in Salisbury, Mazoe, Hartley and Marandellas one-third of the farmers grow this crop. Ground nuts cover the largest acreage of any side crop, though very far behind maize, and yet it is a crop which has only lately come into prominence. In Darwin, with only four farms, the statistics are necessarily exceptional, and 10.5 per cent. of the land is under this crop; in Marandellas 5.2 per cent. and in Salisbury 2.9 per cent. The yield of bags of 83 lbs. gross averages for the whole country 7.4 bags; in Salisbury, with 54 growers, 7.6 bags; in Hartley, with 47 growers, 6.7 bags; in Mazoe, with 52 growers, 9.2 bags; in Marandellas, with 31 growers, 6.1 bags; in Gwelo, with 23 growers, 4.1 bags.

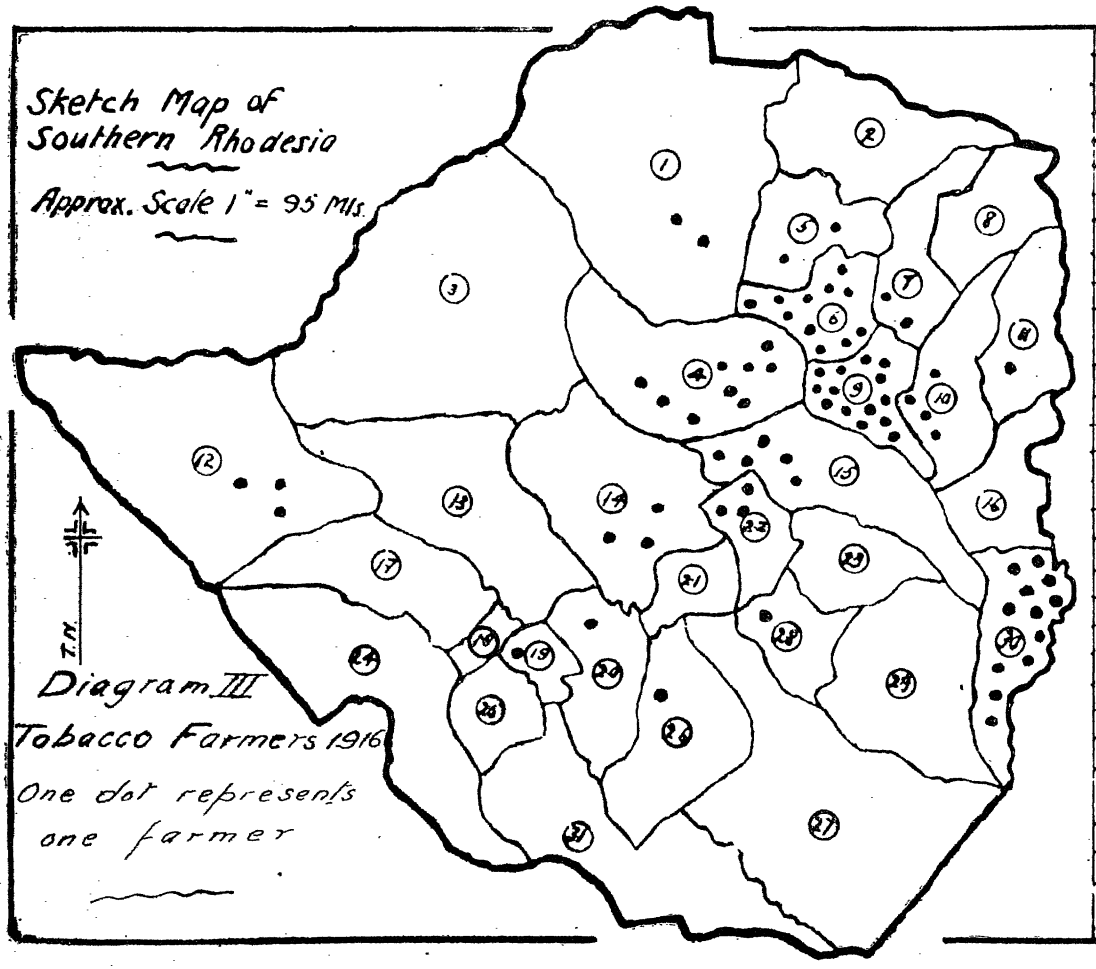
Wheat.—Our production of wheat in 1915-16 was 5,956 bags, about 14 per cent. of our requirements for the year, and the total extent 2,051 acres. The summer wheat sown was 866 acres, and the winter wheat 1,185 acres, a much smaller area than would have been the case but for the exceptionally dry season. In this direction it will be obvious that there is very great room for improvement as regards supplying our local markets, and this crop is recognised to be one entailing relatively less labour than others, and producing, where conditions suit, very remunerative crops. Melsetter is the principal wheat district, with 46 growers out of 79 farmers, and nearly one-fifth of the entire area is under this crop. Charter ranks next, with 18 wheat growers out of 61 farmers, and over 10 per cent. of the cultivated land. Chilimanzi ranks third, and other districts in which wheat is frequently grown are Umtali, Makoni, Marandellas and Victoria. (See Map, Diagram II.) The expansion of the area of summer wheats is a notable feature, and although this crop is largely in experimental stages, we may hope that ere long it will be



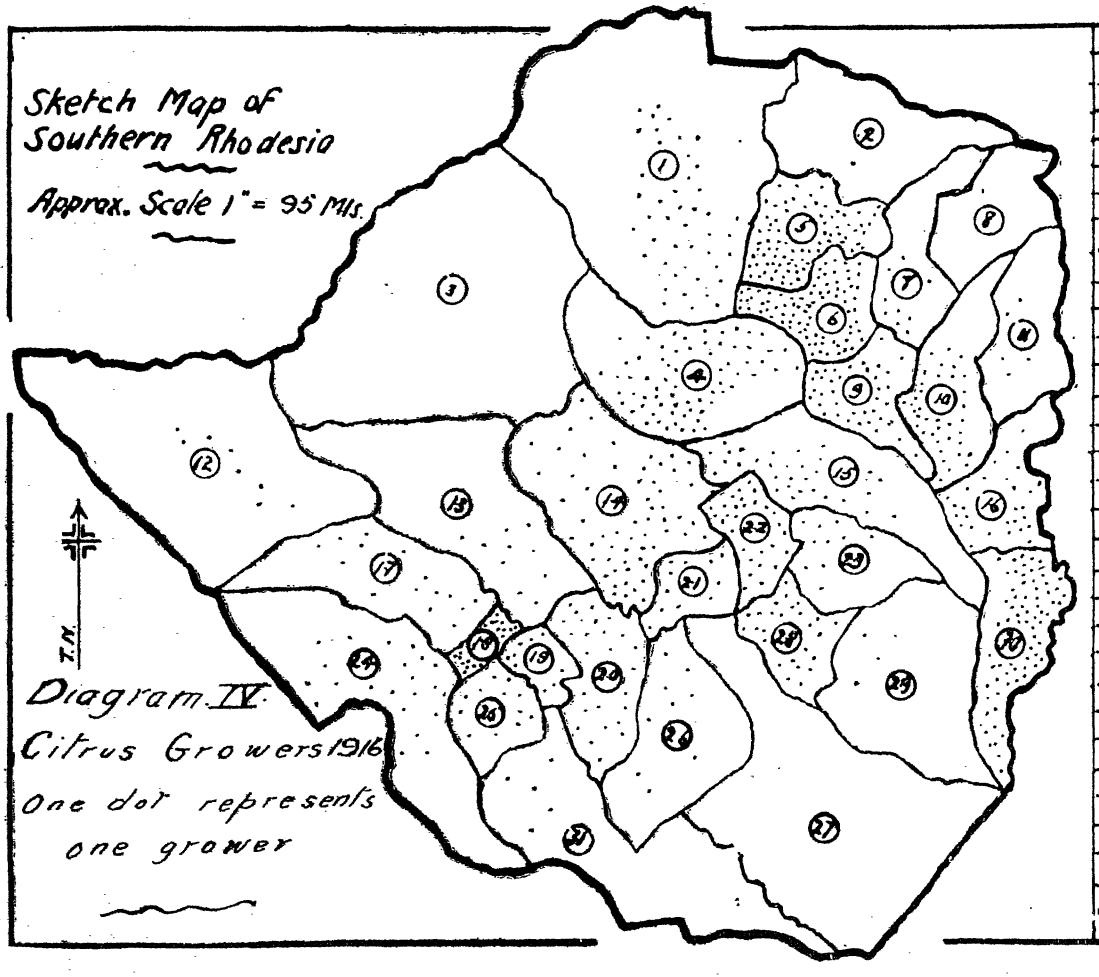
No	District	Farmers
1	Lomagundi	79
2	Darwin	1
3	Sabungwe	0
4	Hartley	126
5	Mazoe	149
6	Salisbury	141
7	Mrewa	15
8	Mtoko	0
9	Marandellas	63
10	Makoni	61
11	Inyanga	7
12	Wankie	16
13	Bubi	25
14	Gwelo	111
15	Charter	44
16	Umtali	39
17	Nyamandhlovu	26
18	Bulawayo	29
19	Umzingwane	14
20	Insiza	50
21	Selukwe	20
22	Chilimanzi	37
23	Gutu	15
24	Bulalima-Mangwe	48
25	Matobo	29
26	Belingwe	15
27	Chibi	0
28	Victoria	34
29	Ndanga	5
30	Melsetter	70
31	Gwanda	7



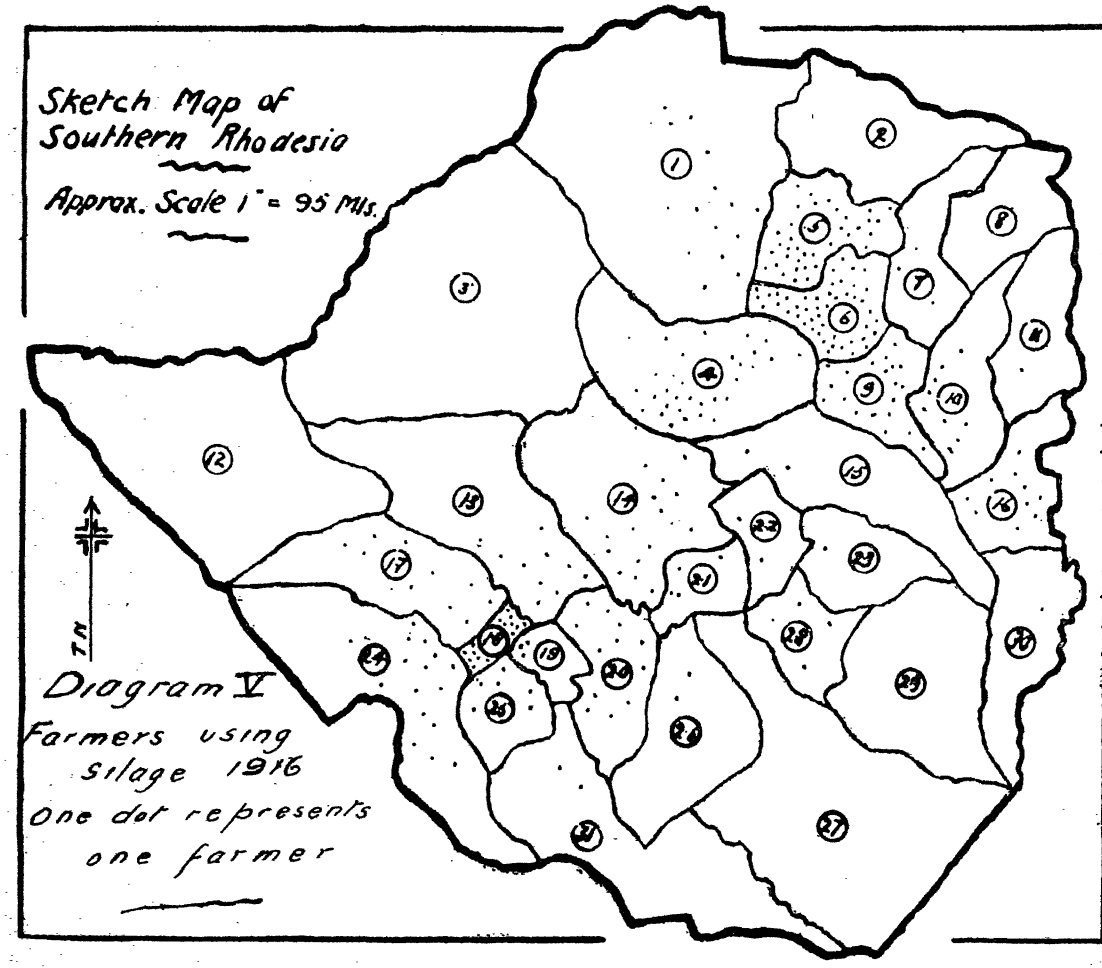
No	District	Farmers
1	Lomagundi	0
2	Darwin	0
3	Sabungwe	0
4	Hartley	4
5	Mazoe	1
6	Salisbury	8
7	Mrewa	3
8	Mtoko	0
9	Marandellas	10
10	Mtoko	22
11	Inyanga	4
12	Wankie	2
13	Bubi	0
14	Gwelo	10
15	Charter	15
16	Umtali	11
17	Nyamandhlovu	0
18	Bulawayo	0
19	Umzingwane	1
20	Insiza	1
21	Selukwe	4
22	Chilimanzi	23
23	Gwelo	4
24	Bulalima-Mangwe	1
25	Matobo	2
26	Belingwe	2
27	Chibi	0
28	Victoria	8
29	Melsetter	2
30	Melsetter	46
31	Gwanda	0



No.	District	Farmers
1	Lomagundi	2
2	Darwin	0
3	Sebungwe	0
4	Hartley	9
5	Mazoe	2
6	Salisbury	11
7	Mrewa	2
8	Mtoko	0
9	Marandellas	14
10	Mutoko	4
11	Inyanga	1
12	Wankie	3
13	Bubi	0
14	Gwelo	3
15	Charter	5
16	Umtali	0
17	Nyamandhlovu	0
18	Bulawayo	0
19	Umzingwane	1
20	Insiza	1
21	Selukwe	0
22	Chilimanzi	3
23	Gutu	0
24	Bulalima-Mangwe	0
25	Matobo	0
26	Belingwe	1
27	Chibi	0
28	Victoria	1
29	Ndanga	0
30	Melsetter	12
31	Gwanda	0



No.	District	Growers
1	Lomagundi	46
2	Darwin	1
3	Sabungwe	0
4	Hartley	69
5	Mazoe	79
6	Salisbury	81
7	Mrewa	9
8	Mtoko	0
9	Marandellas	38
10	Makoni	39
11	Inyanga	5
12	Wankie	8
13	Bubi	11
14	Gwelo	60
15	Charter	31
16	Umtali	28
17	Nyamandhlovu	15
18	Bulawayo	19
19	Umzingwane	9
20	Insiza	26
21	Selukwe	11
22	Chilimanzi	29
23	Gutu	10
24	Bulalima-Mangwe	21
25	Matobo	12
26	Belingwe	9
27	Chibi	0
28	Victoria	26
29	Ndanga	4
30	Melsetter	71
31	Gwanda	5



No	District	Farmers
1	Lomagundi	17
2	Darwin	0
3	Sabungwe	0
4	Hartley	35
5	Mazoe	36
6	Salisbury	47
7	Mrewa	4
8	Mtoko	0
9	Marandellas	20
10	Makoni	10
11	Inyanga	1
12	Wankie	1
13	Bubi	10
14	Gwelo	19
15	Charter	2
16	Umtali	10
17	Nyamandhlovu	13
18	Bulawayo	15
19	Umzingwane	3
20	Insiza	13
21	Selukwe	3
22	Chilimanzi	3
23	Gutu	1
24	Bulalima-Mangwe	22
25	Matobo	6
26	Belingwe	2
27	Chibi	0
28	Victoria	4
29	Ndanga	0
30	Melsetter	1
31	Gwanda	2

TABLE I.

Shewing Distribution of Crops, 1915-16, by Numbers of Growers in each District.

Districts.	Number of farmers in district.	Number of farmers growing crops of																	Number harvesting hay.	Number having silos.
		Maize.	Citrus.	Potatoes.	Tobacco.	Beans.	Ground nuts.	Wheat.	Oats.	Rye.	Manna.	Sunflowers.	Teff.	Napier.	Dhal.	Velvet beans.	Pumpkins.	Majordas.		
Wankie	23	16	8	5	3	2	2	2	1	1	—	1	—	1	—	1	8	4	1	1
Nyamandhlovu ...	35	26	15	8	—	8	8	—	1	1	—	1	1	5	—	4	16	18	15	13
Bulalima-Mangwe	84	48	21	8	—	8	5	1	3	—	2	9	12	13	4	1	21	25	15	22
Matobo	38	29	12	6	—	4	7	2	1	—	—	3	2	2	1	1	10	7	4	6
Umzingwane ...	16	14	9	8	1	3	—	1	3	—	—	—	—	3	1	—	3	3	6	3
Bulawayo... ...	40	29	19	6	—	5	3	—	—	—	1	5	3	5	3	2	5	14	14	15
Bubi	42	25	11	8	—	6	3	—	1	—	2	4	—	7	2	1	12	10	6	10
Insiza	65	50	26	24	1	12	11	1	4	—	3	6	3	2	2	1	19	13	11	13
Belingwe	17	15	9	4	1	3	5	2	1	1	—	—	—	3	4	1	3	2	—	2
Gwanda	15	7	5	2	—	3	1	—	—	—	—	3	—	2	1	—	3	1	1	2
Selukwe	25	20	11	10	—	6	6	4	1	1	2	1	4	6	3	—	5	6	6	3
Gwelo	125	111	60	33	3	34	23	10	6	—	5	11	5	11	4	2	50	33	20	19
Chibi	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gutu	16	15	10	8	—	3	—	4	2	—	1	—	1	2	2	—	8	3	1	1
Ndanga	7	5	4	5	—	2	—	2	—	—	—	—	1	—	—	—	2	1	1	—
Victoria	36	34	26	17	1	10	4	8	2	2	3	4	6	2	1	—	11	6	10	4
Chilimanzi ...	49	37	29	21	3	7	2	22	13	1	3	2	3	4	—	1	18	9	5	3
Charter	61	44	31	15	5	11	5	18	12	1	8	6	3	4	3	1	18	8	10	2
Marandellas ...	93	63	38	26	14	18	31	10	9	2	11	10	13	16	7	—	24	26	10	20
Hartley	149	126	69	37	9	44	47	4	8	—	9	27	24	17	18	13	39	45	36	35
Salisbury	154	141	81	89	11	45	54	8	29	2	18	21	29	23	23	7	59	44	49	47
Lomagundi ...	99	79	46	26	2	16	13	—	1	1	3	6	6	11	7	1	21	7	20	17
Mazoe	156	149	79	49	2	62	52	1	11	3	24	28	29	22	18	4	57	30	38	36
Darwin	4	1	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—
Mtoko	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mrewa	19	15	9	6	2	7	2	3	2	—	6	1	1	2	—	2	5	2	1	4
Makoni	78	61	39	36	4	32	21	22	18	11	2	13	5	5	3	—	23	11	9	10
Inyanga	14	7	5	8	1	6	1	4	6	1	1	2	2	1	1	—	4	3	2	1
Umtali	52	39	28	14	—	19	2	11	7	5	4	4	2	2	3	2	9	8	8	10
Melsetter	79	70	71	24	12	26	1	46	21	1	9	6	1	—	2	—	19	4	1	1
Southern Rhodesia	1,595	1,276	772	503	75	402	310	186	163	34	118	174	156	171	113	45	472	343	300	300

TABLE II.

Shewing Distribution of Crops, 1915-16, by Total Acreage in each District.

Districts.	Acres under crops (all).	Acres under separate crops.																	
		Maize.	Citrus.	Potatoes.	Tobacco.	Beans.	Ground nuts.	Wheat.	Oats.	Rye.	Manna.	Sunflowers.	Teff.	Napier.	Dhal.	Velvet beans.	Pumpkins.	Majorias.	Hay.
Wankie ...	1,874	1,348	14	27	3	4	3	83	20	3	--	4	--	1	—	4	29	17	50
Nyamandhlovu ...	4,154	3,731	12	25	—	77	37	--	2	2	--	1	8	9	--	45	33	145	1,501
Bulalima-Mangwe	4,430	3,703	28	10	—	32	21	3	22	--	15	14	179	15	10	20	48	158	1,086
Matobo ...	2,241	1,698	11	10	--	26	33	110	95	--	--	4	176	2	6	3	31	26	87
Umzingwane ...	2,578	1,666	15	14	1	8	—	2	9	—	--	--	--	4	2	--	5	9	153
Bulawayo ...	2,737	2,259	26	25	—	20	10	--	--	--	10	17	60	5	7	5	10	213	913
Bubi ...	3,763	3,332	11	11	--	38	15	--	5	--	23	15	--	14	21	2	39	66	752
Insiza ...	6,017	5,328	30	28	1	83	65	2	47	--	7	9	132	11	19	8	48	52	1,604
Belingwe ...	611	540	8	8	1	7	12	10	2	8	--	--	--	1	2	10	1	--	--
Gwanda ...	1,055	745	7	1	—	22	10	--	--	--	--	5	--	9	3	--	11	10	173
Selukwe ...	2,123	1,860	17	22	—	17	32	13	1	2	30	2	55	7	8	--	9	26	408
Gwelo ...	11,939	10,884	94	90	5	102	118	73	19	--	25	19	30	42	10	6	138	146	2,242
Chibi ...	—	—	—	—	—	—	—	--	--	—	--	--	--	--	--	--	--	--	--
Gutu ...	1,142	1,022	19	19	--	24	--	15	2	--	1	--	1	2	7	--	10	8	1
Ndanga ...	797	745	4	13	--	10	--	6	--	--	--	--	9	--	--	--	4	5	185
Victoria ...	2,569	2,202	34	13	1	13	7	72	12	7	5	4	14	1	1	--	17	34	231
Chilimanzi ...	3,561	2,766	65	65	4	10	3	258	113	5	4	20	38	52	--	9	37	35	750
Charter ...	4,123	3,113	43	39	4	31	15	426	98	6	38	19	55	14	5	8	24	16	578
Marandellas ...	7,106	4,771	49	74	649	99	372	117	118	7	38	71	111	46	16	--	114	152	554
Hartley ...	21,269	18,515	103	135	83	299	327	31	68	--	56	214	159	26	58	63	141	213	4,228
Salisbury ...	42,332	36,259	186	684	257	319	1,233	59	352	7	194	752	447	95	243	40	435	329	4,859
Lomagundi ...	12,272	11,535	175	77	50	51	90	—	2	30	38	20	22	65	19	5	39	21	664
Mazoe ...	46,282	42,939	376	177	6	609	430	8	138	25	113	464	187	30	23	35	262	264	2,485
Darwin ...	95	80	1	—	—	—	10	--	--	--	5	--	--	--	--	--	--	--	--
Mtoko ...	—	—	—	—	—	—	—	--	--	--	--	--	--	--	--	--	--	--	--
Mrewa ...	1,687	1,185	9	9	118	62	18	34	154	--	25	8	2	1	—	2	14	2	110
Makoni ...	8,335	6,595	60	128	109	301	140	211	281	99	4	46	33	12	3	--	39	21	360
Inyanga ...	600	430	6	13	1	16	12	22	26	1	1	19	5	4	2	--	14	7	134
Umtali ...	4,986	4,225	149	23	—	113	28	97	25	26	10	33	22	11	19	5	12	54	1,097
Melsetter ...	2,088	1,171	174	17	18	31	2	399	67	6	16	6	1	--	5	--	27	4	3
Southern Rhodesia	202,946	176,647	1,726	1,757	1,311	2,424	3,043	2,051	1,678	234	658	1,766	1,746	479	489	270	1,591	2,033	25,208

found generally grown under ordinary rainfall conditions. At present the high prices, and the prospect of their continuance, offer great inducements to farmers to plant greater areas to wheat, and the figures in the tables relating to this crop deserve specially careful examination with a view to greatly increasing the returns next season. Wheat is one of the most profitable and easily grown crops where conditions favour it; it is also one which pays for the high cost of growing under irrigation. At present only about one-hundredth part of the area under all crops is sown to wheat, while nearly one-fifth of the cultivated area in Melsetter, one-tenth in Charter and one-twentieth in Matobo are devoted to this crop. This fact shews the possibilities of wheat in districts of very different character. The average return is 2.9 bags, or say 9 bushels for Rhodesia. Inyanga ranks first with 6.2 bags, or say 19 bushels; Umzingwane second with 6 bags; Gutu third with 5.2 bags; in Melsetter the average is much lower at 3.3 bags, although the crop is so widely grown. Similarly in Charter the average return was only 1.8 bags, and in Matobo 2.9 bags. These figures are in part based on estimates of the winter crops, but are approximately correct.

Oats and Rye.—Oats, though more widely distributed than wheat, are grown to a less extent than that crop. Hitherto the market has been somewhat restricted, but with the prospect of satisfactory inoculation against horsesickness it is likely that the acreage will increase. The average return of oat hay is just 2,000 lbs. per acre. It is more where irrigation is practised.

Rye receives little attention in this country, and deserves more. There are now 34 growers, though these are fairly well scattered over the country. The district of Makoni seems to have adopted this crop more than others.

Pumpkins and Melons.—Both pumpkins and majordas are grown to a less extent than might be expected. They are frequently grown amongst the maize, and farmers, therefore, omit to refer to them in their returns. They deserve growing separately and giving every attention.

Manna.—This crop is also grown less than it should be. It is similar in its use to oats, and a safe summer crop, very

easily grown; it is chiefly found in Mazoe and Salisbury, hardly at all in Matabeleland, although it suits granite soils as well as red soils. Manna occupies only about one-third of one per cent. of the land under all crops. The yield was not asked for, as this crop is generally not weighed, being usually consumed on the farm as forage.

Sunflowers.—Sunflowers are grown by 174 farmers, or nearly 11 per cent. of the total.. Mazoe and Hartley districts lead, but this crop is also very widely grown elsewhere; indeed there are few districts where it is not being tried now as a commercial crop, and until recently it was only regarded as suitable for gardens. The great superiority of the sunflowers grown in Rhodesia is admitted throughout South Africa and in Europe. It has evidently been grown more widely than was imagined, and is steadily increasing in popularity. The average yield for Southern Rhodesia is 582 lbs. per acre, but where most grown it is considerably more; thus for Mazoe 793 lbs. and Hartley 728 lbs. per acre.

Dhal.—Dhal is coming rapidly to the front, and being increasingly grown in spite of injury by frosts. It is satisfactory to find that it is already being sown by 113 farmers, or 7 per cent. of all in the country. At present it is chiefly found in Salisbury, Hartley and Mazoe, but also in most other districts.

Velvet Beans.—Velvet beans are still rather a new crop, and returns have only been received of it from 45 farmers. Its merits deserve to be more widely appreciated, though it seems to be coming to the fore rapidly, and is likely to take its place amongst the regularly grown forage crops of the country.

Teff.—Teff has of late been coming into general use very rapidly, and was last year grown by 156 farmers, or very nearly as many as grow wheat and oats, and more than grow manna. The spread of this crop will be watched with interest, as it does not seem to be restricted to any particular region or soil.

Napier's Fodder.—Napier's fodder is still a new crop in this country, but is already grown by over 10 per cent. of the farmers, and is being rapidly extended, as shewn by the

numerous applications received for it by the Gwebi Experiment Farm, which has already distributed over 100,000 slips this season. From all directions favourable reports on this valuable fodder plant are received, and it appears to be firmly established in all districts where mixed farming and dairying are followed and where green winter fodder is in demand.

Veld Hay and Silage.—By a curious coincidence the number of farmers growing veld hay and making ensilage is precisely the same, and represents 18.8 per cent. of the farmers of the country; but that these are not the same persons is shewn by the fluctuations of the figures in different districts. There is apparently still great room for the more general practice of hay making and preserving green succulent fodder in the form of silage.

Purchase of Rhodesian Maize by the Imperial Government.

We are authorised to state that the British South Africa Company has been able to effect an agreement with His Majesty's Government whereby the latter will accept, at the price of 10s. 6d. per 203 lbs. gross, any quantity of the 1917 crop of maize, grades 1 or 2, offered f.o.r. at any station in Southern Rhodesia. His Majesty's Government will find freight.

No guarantee as to quantity is required, and the arrangement does not bind anyone to deliver maize to His Majesty's Government at the price named, but secures two advantages, namely, a firm market for all surplus and freight.

It is hoped that farmers will take full advantage of this offer and make the most of the time left to increase as much as possible the acreage of maize planted, and consequently the amount to be available for the requirements of His Majesty's Government.

The announcement of this arrangement was made through the press and at all post offices where war telegrams are placarded and by telegraph to farmers' associations as soon as received, and although the planting season was already far advanced, the farming community as a whole welcomed the news, and it is known that as an immediate result and a tangible proof of appreciation a considerable additional acreage of maize was at once planted.

It is clearly stated that no guaranteed quantity is required, and exporters are at liberty to send maize out of the country to any other purchaser for a better price if they can get it. All export of maize will, as last year, be subject to permission from the Administrator, but it is not the intention to restrict export only to one channel, and farmers and merchants will be permitted to sell to other outside buyers than

the Imperial Government if they can do so to more advantage. The option thus accorded should meet the complaint of those critics, happily a very small minority of our farmers, who express dissatisfaction at the price.

Since the first intimation there have, not unnaturally, been numerous enquiries as to how it is proposed to deal with maize for shipment in terms of the offer. The matter is receiving careful consideration, but, as it has not been possible yet to receive letters from England on the subject, it is not known what the intentions of the Imperial Government on the subject are. As buyers of grain on an enormous scale all over the world, it is quite possible they have their own organisation and their own ideas on this subject. Meantime we know that they are prepared to accept graded maize loaded by the vendor on railway trucks.

The question has been raised as to how the prospective surplus can be measured. Obviously export must commence before the sum total of our crop can be ascertained. At first an estimate of our whole crop can only be approximately forecasted, and as the season advances the original figures can from time to time be amended and the amount available for export assessed. This was done last year with a fair measure of accuracy, owing to the completeness with which returns under the Statistical Ordinance were made by the farmers. The precision of our calculations in the aggregate necessarily depends upon the exactitude of the farmers in respect of their individual statements.

As yet the amount of the surplus is problematical and depends on how the season continues, although at the time of writing everything points to an extremely good crop. The returns furnished by farmers as at 31st December last will provide a basis which, with the experience of the average returns received from various districts during the past three years, coupled with local reports as to weather and crop conditions from time to time, should furnish a foundation on which reasonably accurate estimates may be framed. The arrangement, however, it must always be borne in mind, is not for any specific quantity, but for what is available.

It is fair that everyone should be given an equal chance

to export, whether to the Imperial Government or to other buyers, and to this end it will be expedient, perhaps, to issue permits at first on a conservative basis and in some proportion to the amount of the crop of which the particular consignment forms a part. Later, as other outlets are found, crops sold locally, and no application is made from certain quarters, it will be possible to increase the ratio allowed from elsewhere. Certain districts can be expected to find better local markets or outlets to, say, the Congo or the Union, if shortage should occur there, and so more may be sent if wanted from other districts.

Perhaps it is to be regretted that the Imperial Government did not discriminate by a difference of price between grades 1 and 2, but this is no doubt owing to there being no occasion for such distinction, in view of the uses to which our maize is likely to be put for military purposes. It is when normal conditions return, and maize is more difficult to sell, that the difference in price will justify the system of grading. It will be a mistake for us to mark all our grades as second, as this would tend to give an undue impression of the standard of that grade which we could not attain to in future years. Moreover, it is always possible that the Imperial Government might use grades 1 and 2 for different purposes, and so introduce our maize to new markets, an advertisement which will stand us in good stead in years to come. Rhodesia does produce maize of very exceptional quality, and it is right that we should emphasise and make the most of its special merits. The maize will therefore be graded as in past years, but both grades 1 and 2 will be available for export to the Imperial authorities.

The prospect of a record crop for 1917, pleasing as it was, carried with it a dread of a glut and a consequent slump in prices. This was happily counteracted before any ill-effects could appear by the assurance of a remunerative price for maize for the coming year, and of an outlet overseas, which, without the help of the Imperial Government, could not have been guaranteed, so that our maize would quite possibly have commanded no price whatever, whereas as it is now a fair profit is assured. The advantage, therefore, is not only to be measured by the sale of the maize actually

sent away, but to that we should add the difference between the sum that would have been obtained had no such opportunity existed and the actual price which will be given for the balance retained in Rhodesia next season. In the aggregate this enhancement of local prices will amount to a very considerable figure, although, owing to the system of export under permit, there need be no fear of an undue quantity being shipped and an inadequate amount being retained here. A second cause of fear was that there would be a lack of ocean freight, but as the Imperial Government now controls all movement of shipping, we can rest assured that adequate space will be provided for our needs in this respect. Further, it is to be noted that all farmers throughout the Territory are put as nearly as possible on the same footing by the assurance of the same price on rail at any point. The farmer who, for one reason or another, is obliged to realise his crop early in the season is assured that he is not doing so at any undue sacrifice. The general benefit of an assured price is already being felt in commercial circles, and farmers' credit has improved, leading to a strengthened financial position and renewed possibilities for development.

The price of ten shillings and sixpence a bag for our surplus, unconsumable in the country, should not be contrasted with the current local price for the balance of last year's crop, notoriously a small one, still on hand, which is selling at a much higher figure, even although full advantage has not been taken of all export permits granted. Nor should the export price be regarded as necessarily fixing the local price at the same figure, although it may well have a tendency to prevent speculation in maize and undue fluctuation between the beginning and end of the season, and will thus exercise a steadying influence on the price of the entire crop throughout the year, preventing manipulation of the maize markets, which disturbs trade, and from which the ordinary farmer derives no benefit.

Farmers are under no obligation to sell, and if for any unforeseen reason the present hopes of a heavy crop are not realised, we are not committed to supply anything, nor even all of whatever surplus there might be.

If this outlet had not been found, and freight (as is quite

certain) through any other medium had been unobtainable, then prices would have fallen very seriously; indeed, maize would have been largely unsaleable at any price.

No doubt Rhodesian farmers in general, although there may be a few grumblers, will feel proud to be able to provide food to the Mother Country and her army at such a time as the present, and be thankful to be able to do her a service, and at the same time to benefit themselves thereby.

The recognition obtained for Rhodesian maize in the Home market is a gratifying fact, proving that the farmer of this country, by working his land and growing large crops, is contributing directly and usefully to the great cause, supplying essential material for feeding man and beast at the front, and making good the shortfall of production in England and France. In our December issue we urged upon the farmers the duty of planting as much as possible, and the arguments then used for the production of such a large surplus as would command a market are already fully confirmed.

A further benefit is the advertisement obtained of our ability to produce maize, and a recognition of Rhodesia as a source of supply which will prove of lasting value to us in the world's markets when normal conditions return.

Quarter Evil.

By C. R. Edmonds, M.R.C.V.S., and G. Pinchin, M.R.C.V.S.

Owing to several outbreaks of this disease having occurred this season in the southern portion of this Territory, numerous requests from cattle owners have been received for information upon the subject, and to meet this desire the following article has been written.

The disease is one of the oldest known of all diseases, and is also known by a great variety of names, such as Black-leg, Quarter-ill, Black-quarter, Symptomatic Anthrax, Struck, etc. In South Africa it is commonly called Sponsziekte. The disease occurs in all the great continents, but it has everywhere a regional distribution, and there exist large areas where the disease is unknown. It may also be prevalent on one farm and not on another adjoining, and some fields on an infected farm are worse than others. Within quite modern times, the disease has almost entirely disappeared from certain parts of England. Moorland and permanent pastures are the worst infected places, cropping and draining of the land being apparently unfavourable to the organism. The majority of the cases are sporadic, but the bacilli from a carcase may infect other animals, though, if such cases ever do occur, they are very rare.

The disease is caused by a parasite that to a great extent is confined to the tissues at the site of the disease and not the blood stream. The parasite (a bacillus) is what is known as a facultative anærobic saprophyte, and its normal method of existence is as a soil bacterium.

The animals most susceptible to the disease are young cattle of from 6 to 24 months old, calves and animals over

3 years old rarely becoming infected. Sheep are also susceptible, and are affected at all ages. Like many other diseases, the individual susceptibility varies considerably, some animals apparently possessing considerable powers of resistance to the disease.

The natural method of infection has been much disputed, but probably the weight of opinion is in favour of the theory that this takes place by ingestion, and that some unknown circumstances are present to render the ingested spore infective.

The disease is rapid in its onslaught, often the first intimation of it being the finding of an animal dead. When a case is seen earlier than this, besides the ordinary symptoms of illness with a dejected appearance and trembling, the animal, if made to move, will exhibit lameness, or stiffness, and a swelling will be found, the hind quarters and the shoulder being the favourite sites for swelling, though it may occur on other portions of the body. This swelling at first is hot, painful and doughy, but it quickly becomes emphysematous, that is, blown up with gas; it crackles if you rub it, and sounds hollow if you tap it with your fingers; the skin over the swelling becomes painless, cold and leathery; in fact dead. After death, if one cuts into this swelling, one will find emphysema present, the centre of the swelling more or less dry, and a sour rancid odour, that is if decomposition has not yet set in. We are particularly anxious that readers should implant these symptoms firmly in their memories to enable them to distinguish Quarter Evil from other diseases. The only two that are likely to be mistaken for it are anthrax and snake bites. In anthrax the blood is black and tarry looking and does not clot, and the spleen is always enlarged. In Quarter Evil the blood appears unaltered and clots normally, and the spleen is never enlarged. In snake bites there is always the hole caused by the snake's fangs, the swelling is not so large, it is not emphysematous, it has not got a rancid sour odour, it is not dry in the centre and the blood clots quickly and firmly.

There is no known treatment for the disease. It runs a very acute course, and very few infected animals recover. The carcase of an animal dead of the disease should, if possible,

be burnt where it lies, and if it is buried it should be buried deep, covered with quicklime if at hand, and the grave fenced off to prevent animals subsequently grazing over the spot.

From the muscle of the infected portion of the animal a vaccine is prepared, and, in places where the disease is of annual occurrence, the young cattle are vaccinated (inoculated) every year, mostly in the spring. It is held that a week after inoculation the animals are immune to the disease, and this immunity lasts for nine to twelve months; on the other hand it is generally speaking not advisable to carry out vaccination on farms where the disease is only an occasional visitor.

Having given a brief resume of the disease as known in other lands, we can now consider it more particularly as affecting Rhodesia, and the first thing that strikes one is that it is not recognised by the natives, but that odd cases do occur has been proved to us by farmers, who have had experience of it elsewhere, diagnosing it in Rhodesia. We think a perusal of this article will assist in its recognition, and in future less cases will be put down to snake bites than has been done in the past. The first time the disease was really diagnosed in this country was in 1911, when a few animals died at Redbank and others at Insiza.

At the beginning of this article is the statement "that some unknown circumstances are present to render this ingested spore infective." One of the conditions favourable to the development of Quarter Evil that has always been recognised obtains at the time when the grazing is conducive to the young animal rapidly improving in condition, or making blood as it is sometimes called, and these are the conditions that have existed during the present season. It was also noted that the animals that were thriving best in the troop were invariably the first to succumb to the disease, and this also has been recorded in the present outbreak. To counteract this tendency, it was the old custom every spring to drench the young animals with Epsom salts, bleed them and put a seton of tape covered with some blistering ointment or a piece of tarred rope through the dewlap; some owners relying on one or other of these practices, others adopting all. These methods of preventive treatment are now scientifically regarded as so much witchcraft, but, like other forms of that art, are

still practised to a greater or less extent. The treatment that is recommended for places that only occasionally get the disease is to keep the young stock in the spring, when the grass shoots and becomes plentiful, upon some high lying, rather poor pasture, and, if the disease breaks out, to move the kraal and feeding ground to a fresh portion of the farm. This frequently stops the disease at once.

One or two what may almost be called irregularities have happened in this present outbreak of the disease. In one instance at two adjoining outbreaks, only sheep were dying at one and only cattle at the other, although both classes of these animals were present at both places. A large proportion of animals apparently recover in Rhodesia. Another thing is that odd cases of the disease have occurred in animals over three years old; probably this is due to animals having escaped infection and immunity during their young life. In strangles, which is also a complaint of the young, frequent cases have been observed in Rhodesia amongst aged animals.

The question that is at the back of many minds at the present time is: "Is Quarter Evil going to become an annual occurrence, and shall we have to inoculate for it?" As we get more thickly populated with cattle the chances for it to become of more frequent occurrence will be certainly enhanced. On the other hand it can be argued that there is no reason for it to change its nature of an occasional disease in Rhodesia any more than for a leopard to change its spots. It is to be hoped that the latter will prove to be the case, and there is no need to prophesy on the matter, for time will prove it one way or the other.

EXPLANATIONS.

Sporadic: Occurring here and there.
Facultative: Capable of adapting itself.
Anærobic: Thriving, but without air or oxygen.
Saprophyte: Organism living upon dead or decaying vegetable matter.

Nature Notes.

I. THE EMPEROR MOTHS OF SOUTHERN RHODESIA.

By Rev. Father O'Neil, S.J.

Amongst that vast assemblage of insects known as *Heterocera* or moths undoubtedly the handsomest and largest are the *Saturniidæ*, popularly styled Emperor Moths. They are to be found all over South Africa, but no part of the sub-continent contains so many and such splendid species as does Southern Rhodesia. The richness of our fauna in this respect is shewn by the fact that, whereas only 25 different *Saturniidæ* have been recorded from the whole of the Transvaal, no fewer than 19 species have been captured in the immediate neighbourhood of Salisbury, and the caterpillars of three other kinds have been found in this locality quite recently. Thirteen other kinds of Emperor Moths have been taken in Matabeleland, and we may be sure that the Umtali and Melsetter districts will reveal many others when they are explored systematically by collectors. It is, indeed, highly probable that more than 50 species of these fine moths will have been recorded from Southern Rhodesia within the next few years. Any collector, especially in the unworked districts of Umvuma, Victoria, Umtali and Melsetter, has an excellent chance of adding to the number of our known species; and it is to encourage the search for new kinds, and still more, to stimulate interest in the study of the wonderfully rich and varied insect fauna of this country, that I propose to write something about the *Saturniidæ* of Southern Rhodesia.

These moths, with the exception of two or three of the smallest kinds, can be recognised easily by the large eye-like spots or the curious window-like transparent spaces in the fore and hind wings. Some of the moths are of huge size, three Rhodesian species having a wing expanse of 7½ or even 7¾

inches, while ten others expand from 5 to 7 inches across the wings.

The caterpillars are no less interesting than the perfect moths, some of them being really beautiful objects, their bodies set with rows of long thorn-like spines or warty tubercles furnished with bristles. These caterpillars are sometimes gregarious, from fifty to two or three hundred being seen feeding on a single tree; but in the case of most species the caterpillars are found singly or in small lots of two or three individuals. Some kinds are coloured exactly like the foliage among which they are hidden, and were it not for the large droppings, which reveal their presence at once, it would be almost impossible to find them. Three or four of our local species live on grass, and these are the hardest of all to detect, and also the most difficult to rear.

If you wish to breed these Emperor Moths from their larvæ or caterpillars, the best plan, according to my experience, is to stand a small branch of their food plant in a bottle or jar of water, taking care to plug the mouth with cotton-wool. The reason for this precaution is that the caterpillars always crawl down as far as they can go just before they change their skins—which they do four times before attaining their full development—and they will certainly drown themselves if they can make their way into the water. You should keep the food plant under a screen, made of muslin or some other light material nailed to a wooden frame, otherwise the caterpillars may crawl away, or be stung by ichneumon flies, or else be carried off by that large yellow-legged wasp—*Pelopæus* is its name—which flies into the rooms of our houses and often builds its mud nest close to the ceiling. This wasp stores the nest with caterpillars for its young, and if it were to find any caterpillars feeding in or near the room, it would paralyse them with a sting and bear them off to the nest. It is necessary to renew the food of the caterpillars at least once a day, for they will not eat leaves or grass unless these are quite fresh.

When the caterpillars are full grown, they cease to feed, drop to the ground, and begin walking about in search of a spot in which to pupate. They should then be put into a tin or box half filled with slightly moist sandy soil, which must

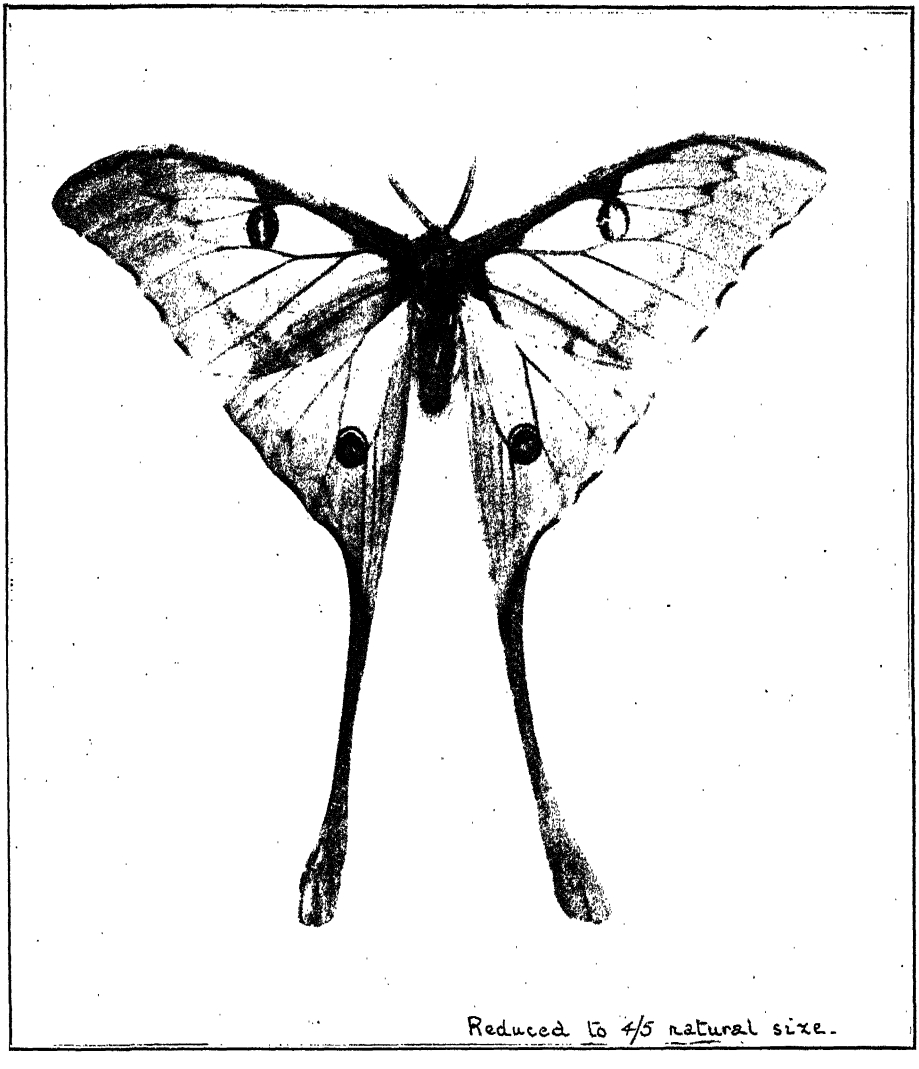


Plate I. Argema mimosæ, *Boisd.*—Male.

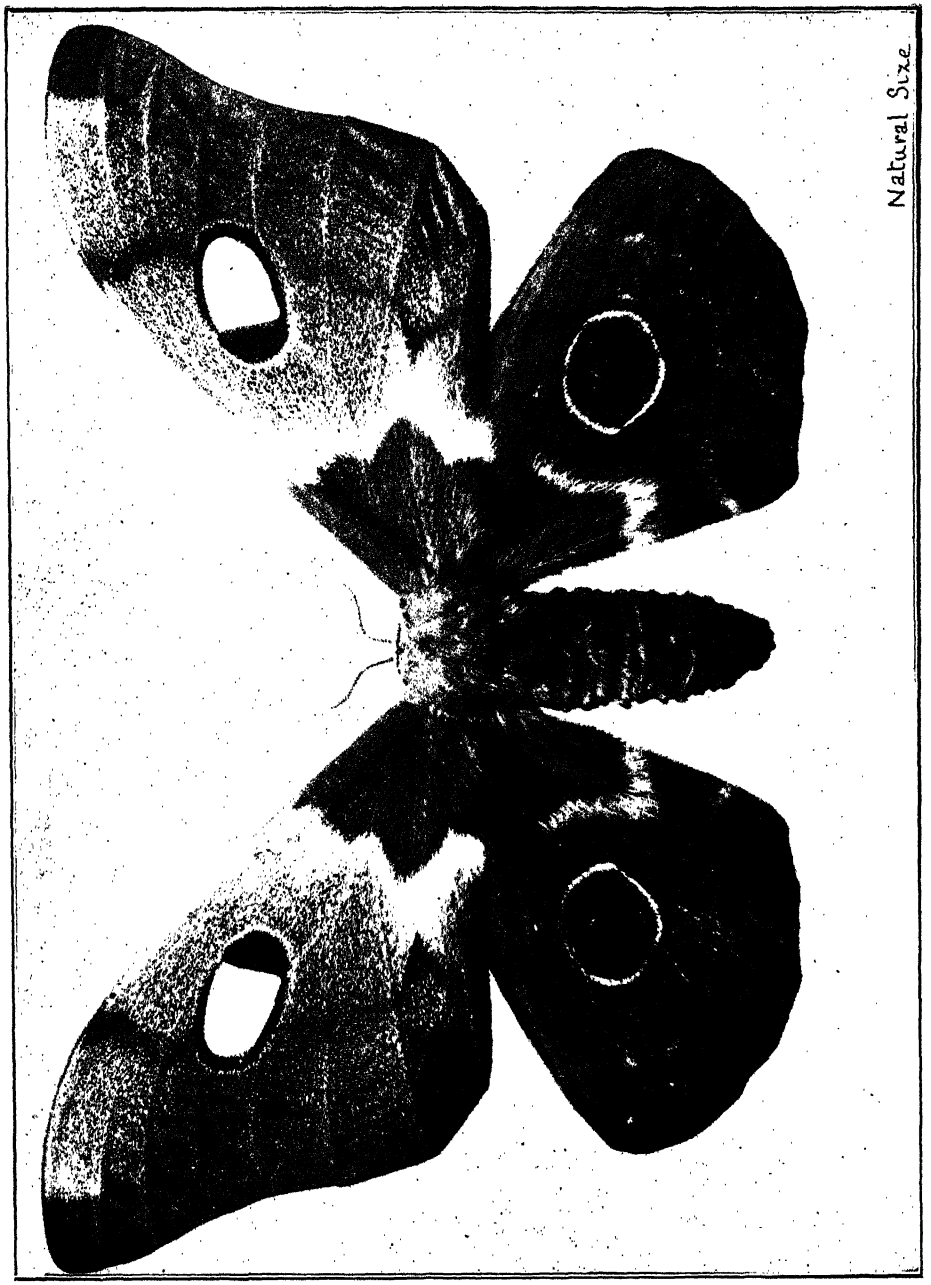


Plate II. Bunæa sp.—Female.

first be sterilised by being baked for about an hour. The caterpillars burrow into the soil and disappear, and after twelve days or so the chrysalids or pupæ may be unearthed and placed in another box on sand or cotton-wool. There they remain till the following summer, when the moth will emerge, between the end of September and the beginning of January according to its species. It should be remarked that caterpillars ready to go to earth must not be put into a box containing others that have gone down a day or two before, otherwise these last will be disturbed in the act of pupating and will probably die. Keep the pupæ slightly moist by damping the sand or cotton-wool on which they rest, once a fortnight during the dry months and rather oftener after the beginning of September. If they are allowed to become too dry there is great danger of the moths emerging with crippled wings. This method of rearing the larvæ of *Saturniidæ* is commended by the success that has attended it. Last year I reared 80 *Saturniid* caterpillars, representing eight different species. Seventy-eight moths have emerged from them, and only one had crippled wings. The other two pupæ are still alive (16th January) and apparently healthy.

Let me now say something about some of the beautiful Emperor Moths to be found in this country. The finest of all is a magnificent moth, named *Gynanisa semialba*, which is to be seen on Musasa trees (*Brachystegia Randii*) about Salisbury during the month of December. This splendid moth has the outer half of the fore-wings either light or dark brown, with darker bands or lines, the inner half and a narrow area near the tip of the wings being closely covered with short, snow-white hairs. The hind-wing has a very large circular eye-like marking, made up of five concentric rings of various colours enclosing a black spot. Near the inner margin (*i.e.*, the margin nearest to the body) are more of the snowy hairs, while the remainder of the wing is reddish purple or claret-coloured, with four outer bands, two of them black and two brown. The accompanying illustration, Plate III., gives a good idea of the appearance of the female moth. The male has a more elegant shape, the fore-wings being more narrowed towards the tip and having a more wavy outer margin, while the hind-wings have a short and broad tail. As is the case with nearly all the *Saturniidæ*, the antennæ of the male are

beautifully feathered or pectinate, those of the female being simple.

Gynanisa semialba should be looked for on the Musasa trees from the beginning of December till Christmas, and newly emerged females are usually found pairing with the males. I have taken the moth near Salisbury on various dates between 6th and 24th December. It is to be seen settled on the trunk of a well-grown tree, in which case it looks very like a large piece of bark and lichen, or it may be noticed resting with outstretched wings on the foliage of a small Musasa bush, sometimes quite close to the ground. There is no difficulty in seizing it, as it doesn't make the slightest attempt to fly away during the daytime. The eggs of this moth are of a dull greyish-white colour with brown bands, and they are laid on the leaves of the Musasa tree in numbers varying between four and eight. The full-grown caterpillar is a very lovely creature, bluish-green in colour and furnished with rows of long golden spines. It should be looked for in February. The young larvæ are quite different in appearance, and may be found any day after the middle of January. This grand moth is not very uncommon about Salisbury, but I am not aware that it has been taken in any other locality, and it is quite unknown in countries south of Rhodesia. I think *The Snow-capped Emperor* would be a good popular name for the moth.

Another equally large and very beautiful *Saturniid*, fairly common in the Salisbury district, belongs to the genus *Bunæa*. It appears to have a wider range than *G. semialba*, for specimens have been taken at Que Que and in the Victoria district. This gigantic *Bunæa*, of which we give a figure of a very large and very dark female (Plate II.), has not yet been described, as far as can be ascertained. In the fore-wings there is a large, oval, transparent, window-like space bounded by a rich crimson ring, and the hind-wings have a round, ocellate (eye-like) marking, consisting of a black circular spot enclosed in a broad crimson ring and an outer narrow ring of white. The basal area of the fore-wings (*i.e.*, the part nearest the body) and the outer margin of both wings are ochreous yellow, while the median or central part of the fore-wing, and the upper or costal area as far as the outer ochreous margin, are more or less covered with short snow-white

hairs. The hind-wings are very dark greyish-purple with two narrow white bands, one sub-basal (*i.e.*, pretty near the body), and the other close to, and parallel with, the ochreous margin. In some specimens this outer white band is very narrow and regular; in others it is much broader and of irregular width. One beautiful variety of the male, which is to be seen in the collection of the Entomological Department, Salisbury, has nearly all the fore-wing and great part of the hind-wing white. As mentioned above, the large female figured is an extremely dark variety of the moth.

The caterpillar of this lovely *Bunæa* feeds on the Musasa tree in the neighbourhood of Salisbury, and the moth is to be found on the tree occasionally. But it is difficult to perceive, as it hangs down in such a way that only the very sombre underside is visible. I have taken it from the middle of December to the middle of January, and a very large male, in good condition, was once brought to me as late as 26th March. The eggs, usually laid in batches of five, are round and white, and look exactly like Carter's Little Liver Pills. The adult caterpillar, to be looked for from the middle of January to the end of February, is very large, alternately light green and mauve in colour, and studded with dark red spines, which are closely set with stout, straw-coloured bristles. These bristles are so strong that the grown caterpillar is by no means a pleasant thing to handle.

We have in Mashonaland two other large *Bunæas*, which resemble each other so closely that many entomologists regard them as merely varieties of the same species. But the adult larvæ are so different in shape and structure that there is, in my opinion, not the slightest doubt that the moths are specifically distinct, and, indeed, they have been described under two names. *B. macrothyris*, the male of which is figured on Plate V., is much the darker of the two. The fore-wings are slate-grey or mouse-brown in colour except for an irregular mauve or lilac band near the outer margin. In the hind-wing the median area is scarlet with a large black spot in the centre; the outer marginal area is mauve or lilac, and the space between the inner margin and the red patch is of the same colour as the fore-wings. In the fore-wings there is a transparent space, very minute in the male and much larger in the female, and the centre of the hind-wing black spot is also transparent.

In the female the scarlet patch of the hind-wings is, as a rule, much smaller than in the male. One lovely variety of the male which I took at the end of November, 1915, has the whole area of both fore- and hind-wings bright scarlet, except for the black spot and the sub-marginal lilac bands. In this variety the body too is scarlet; in typical specimens it is mouse-grey, sometimes suffused with red.

The species closely allied to the above is *B. natalensis* (also called *B. patruelis*), and it is found, though rarely, in the Transvaal and Natal, as well as in Rhodesia. In this species the fore-wings are olive-green or buff, sometimes very strongly suffused with red, and across the wing are three narrow, wavy bands, one or more of which may be absent or very faint. The hind-wings are similar in colour and pattern to those of *macrothyris*, except that the inner and outer marginal areas are olive-green or buff. On the under-side the ground colour of *macrothyris* is distinctly grey, while the under-side of *natalensis* is of the same light colour as the fore-wing upper-side. I have one large and very beautiful female in which both the fore- and hind-wings, except for the wavy bands, the black spot and the hind-marginal areas, are bright scarlet. This may be, and probably is, a variety of *natalensis*; but it may prove to be a different species, as the hind-wings are much more rounded than those of all the examples of *natalensis* that I have seen.

The caterpillars of these two allied *Bunaeas* feed on the Musasa tree, and the colour of each is exactly that of the foliage among which they are to be found. The larva of *natalensis* is covered all over with small, dark-green spots, and on the fourth segment of the body there is a long, oblique, raised keel, usually silvery white, but occasionally golden in colour, and the eight abdominal feet by which the creature clings to its perch have only a very few bristles. The larva of *macrothyris* is considerably broader than that of its congener; it has no trace of a keel on the fourth segment; the dark green spots cover the dorsal surface only; the abdominal feet are closely set with black bristles, and the stigmata, or air holes, are very dark purple. This caterpillar drops pellets of frass of enormous size, and these at once draw attention to its presence on a tree. But you must look very carefully before you will find it. It is nearly always found high up on

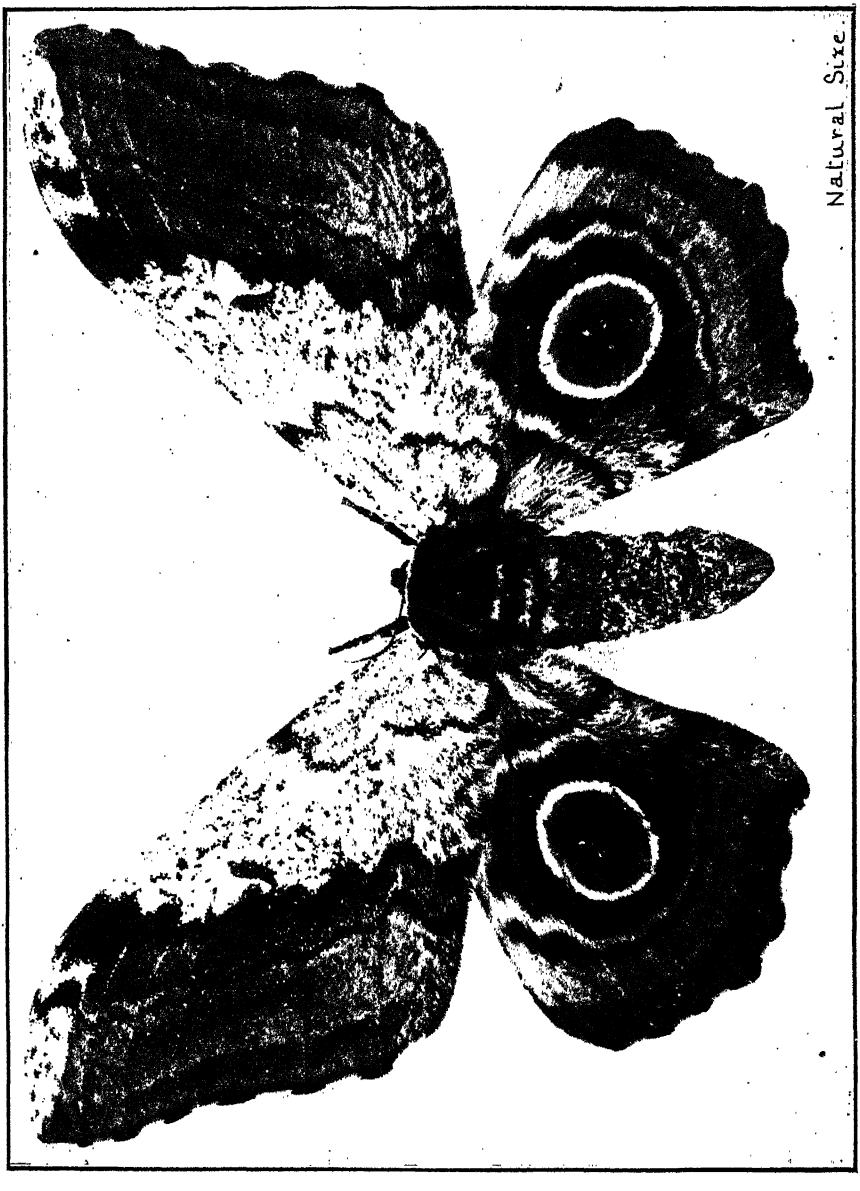


Plate III. Gynanisa semialba, *Sauth.*—Female.

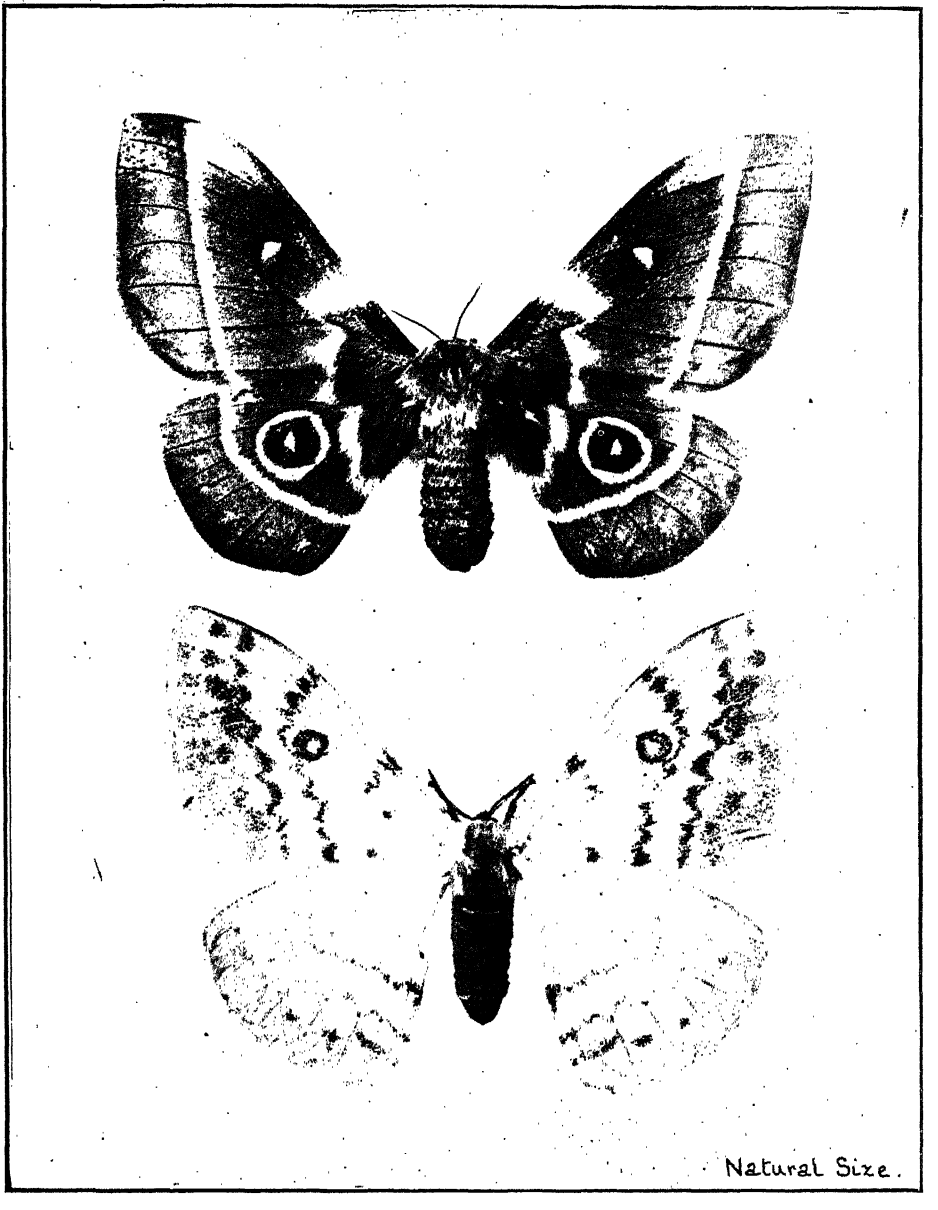


Plate IV. Imbrasia sp.—Female.
Copaxa flavinata, *Walk.*—Female.

the tree. Another thing to be observed of these two moths is that (at Salisbury at any rate) *natalensis* makes its appearance at the end of September, and is not to be found after October, while *macrothyris* doesn't come out till the middle of November, and is found in greatest numbers during the month of December. The adult caterpillar of the former moth is to be looked for from Christmas till the end of January; that of *macrothyris* during February and in the early part of March.

Another large and handsome *Bunæa* is *B. alcinæ*, common in Mashonaland, and found all over South Africa. The ground colour of both wings is brown, darker in some specimens than in others. In the fore-wing of both male and female there is a large rectangular transparent space, while the hind-wing ocellate spot is mainly orange red, transparent in the centre and ringed with black and white. The costal area of the fore-wing and sub-marginal areas of both wings are covered with short hairs and scales of a very light mauve tint. The caterpillar of this moth is a most striking object, 4 to 5 inches in length, coal-black in colour, and with eight long ivory-white spines on each segment. On each side of the body there is a row of eight large crimson spots. These caterpillars are eaten by the natives of Mashonaland, who call them *mashondjgwa*. They are gregarious, and usually feed, sometimes in great numbers, on an umbrella-like tree (*Cussonia sp.*), the native name of which is *mufenje*, and which grows on the hills in the Salisbury district. The caterpillars feed with rapidity, and are very easy to rear. As a rule the female moth lays from 60 to 70 eggs, placed close together to form a rectangular mass. The eggs are round and white, like those of our largest *Bunæa*, but smaller.

In the Bulawayo Museum is a single specimen of another very large *Bunæa*, which was probably captured somewhere in Matabeleland, but unfortunately the locality was not tabulated. I have only seen a very roughly coloured sketch of this moth. The ground colour appears to be grey or greyish purple, lighter towards the base and outer margin. Both wings have a large ocellate mark, made up of a broad crimson ring surrounding a black circular spot. This species is certainly not found south of Rhodesia, and it is a great pity that we don't know where it was taken. Let me here remark that

collectors should always label their specimens with the locality and the date on which they were captured or emerged from the chrysalis.

The most curious of all our South African Emperor Moths is *Argema mimosæ*, which occurs in numbers on the Natal coast, and is found, though rarely, in the Transvaal. In Southern Rhodesia it has been recorded from Bulawayo, the neighbourhood of Plumtree and Umtali. Nobody has yet, to my knowledge, come across the moth in the Salisbury district, but it is not at all improbable that the species is to be found here. The accompanying illustration (Plate I.) shews exactly what the moth looks like, and it is only necessary for me to state that the colour is light green, the ocellate spots being yellow and brown. The basal half of the long "tails" of the hind-wings and the costa (upper margin) of the fore-wings are chocolate brown. There is practically no difference between the male and female. Ten years ago I found a nearly full-grown larva of this extraordinary moth about 20 miles south of Plumtree, and reared a very beautiful specimen from it. My only recollection of the caterpillar is that it was green in colour with silvery blotches and patches, and that when full fed it made a very hard cocoon.

An extremely pretty *Saturniid* moth, found in Salisbury and its neighbourhood, is the *Nudaurelia* figured on Plate VI. Unfortunately the picture doesn't give a very good idea of the fore-wing pattern. This wing has the costa and outer margin bright yellow. The eye-like spot is grey or light brown, enclosed in a narrow ring of black and two outer rings of pink and carmine. Across the wing are two double bands of pink and black, and the remainder of the wing is greyish black divided into 17 patches by the two transverse bands and by seven bright yellow longitudinal bands. The hind-wing median area is either bright yellow or yellow and carmine, the ocellate marking being composed of a large light brown spot surrounded by three rings, the innermost of which is black, the second, and broadest, crimson, and the outermost pink. The outer margin of the wing is yellow, bounded on its inner edge by a black band, next to which is a narrow band of pale pink. This singularly pretty moth, which seems to be an undescribed species, is found every now and then around Salisbury, and probably occurs throughout the greater part of

Mashonaland. Most specimens captured are rather worn and faded, and the only two brilliant examples I have seen are a couple of males which I bred from the larvæ. These caterpillars feed on various grasses, and are grass-green in colour with a bright yellow ring and eight brownish-red, thorn-like spines on each segment.

A second and much rarer *Nudaurelia*, also found about Salisbury, is *N. jacksoni*. In reality it is a local form of a more brilliantly-coloured species, found in Natal and in the Transvaal, and known as *N. arabella*. In our form the body and the greater part of both fore- and hind-wings are of a rich carmine tint. The hind margin of the wings is bright yellow, and on its inner edge is a row of large, black, nearly rectangular spots, separated from each other by narrow yellow lines. The eye-like marks on the fore- and hind-wings are smaller than those of our commoner *Nudaurelia*. *N. jacksoni* seems to have its headquarters in Uganda, and its occurrence so far south as Mashonaland has caused surprise. It appears to be rare in this country. A grass-feeding caterpillar, green in colour, with three golden keels on each side of the body, and narrow carmine bands between the segments, is probably the larva of this moth. Some time ago three of these caterpillars were sent to me; but they refused to feed and all of them died.

Of the medium-sized *Saturniidæ* that occur in Rhodesia, perhaps the most beautiful is *Cinabra* (also called *Gonimbrasia*) *hyperbius* (see Plate VI.). This moth is quite common around Salisbury, where its larva is to be found in December and January feeding on the Musasa tree, or more commonly on a small Protea that grows all over the veld. The caterpillar has also been taken this summer in the neighbourhood of Bulawayo.

This very pretty moth has a wing expanse of from $3\frac{3}{4}$ to 5 inches. The fore-wings are bright brick-red, turning to shining lilac towards the outer margin. There is a sub-basal greyish or lilac band (often very faint in the male), and a similarly coloured transverse narrow band beyond the middle of the wing. The hind-wings are covered with long brick-red or pink hairs near the inner margin; the median area of the wing is bright yellow (red in the typical form of the moth

found south of Rhodesia); the ocellate mark is greyish black in the middle, with an outer ring of intense black colour; towards the outer extremity of the yellow patch is a dark bluish grey band; the hind margin is red, and on its inner edge is a broad band of lilac or bluish grey. The fore-wings have a minute transparent space. In one large female which I bred last year the colour of the wings is very dark, the red of the fore-wings being clouded with bluish grey, and the discal and sub-marginal bands being very broad and dark. The eggs of *Cinabra hyperbius* are olive-brown in colour, and shaped like those of a plover. The grown caterpillar is very pretty; of a green colour, with six black spines on each segment, a row of triangular dark red spots on each side, and a broad mark of similar colour just behind the head. This caterpillar feeds and grows very rapidly when fed with the succulent leaves of the Protea.

A smaller species of *Cinabra*, *C. pygmæa* by name, is found at the Victoria Falls. It resembles *hyperbius* in most respects, but has no lilac or bluish-grey bands on the wings, and the hind-wings are of a deep orange colour, broadly margined with lilac.

Among the figures that illustrate this article will be noticed one of a female *Imbrasia* (Plate IV.), which has not yet been described. This is a rather large, plainly-coloured *Saturniid*, abundant in the Salisbury and Umvuma districts. The fore-wings of the male are either grey or light brick-red, with a narrow black line parallel to the outer margin; those of the female are of a rich brownish purple hue, and beyond the middle is a straight, white band, connected near the costa with a broad patch of white. There is also a sub-basal irregular white band, wide near its upper extremity, and a row of contiguous triangular white spots near the outer margin. The hind-wings are concolourous with the fore-wings, and have a well defined white band beyond the middle. The large ocellate mark is orange in the middle, ringed by black, crimson and white. It is to be noted that the hind-wing of the male is sharply angular at its lower extremity, that of the female being rounded. The caterpillars of this *Imbrasia* are large and black, and covered with soft, downy, white hairs. They are gregarious, and may be seen in January or February feeding in numbers high up on the Munondo tree in Mashonaland.

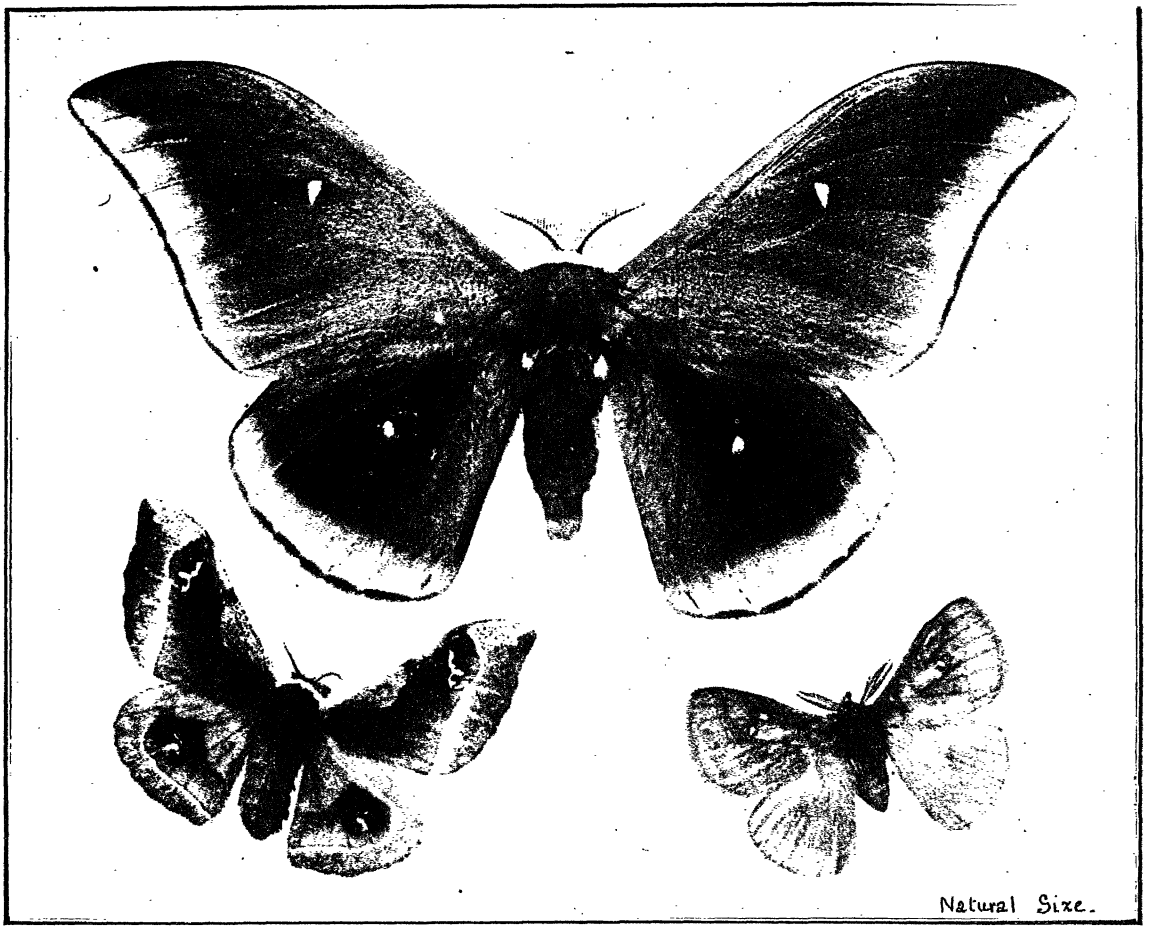


Plate V. Bunæa macrothyris, *Roths.*—Male.
Ludia sp.—Female. Decachorda pomona, *Weign.*—Male.

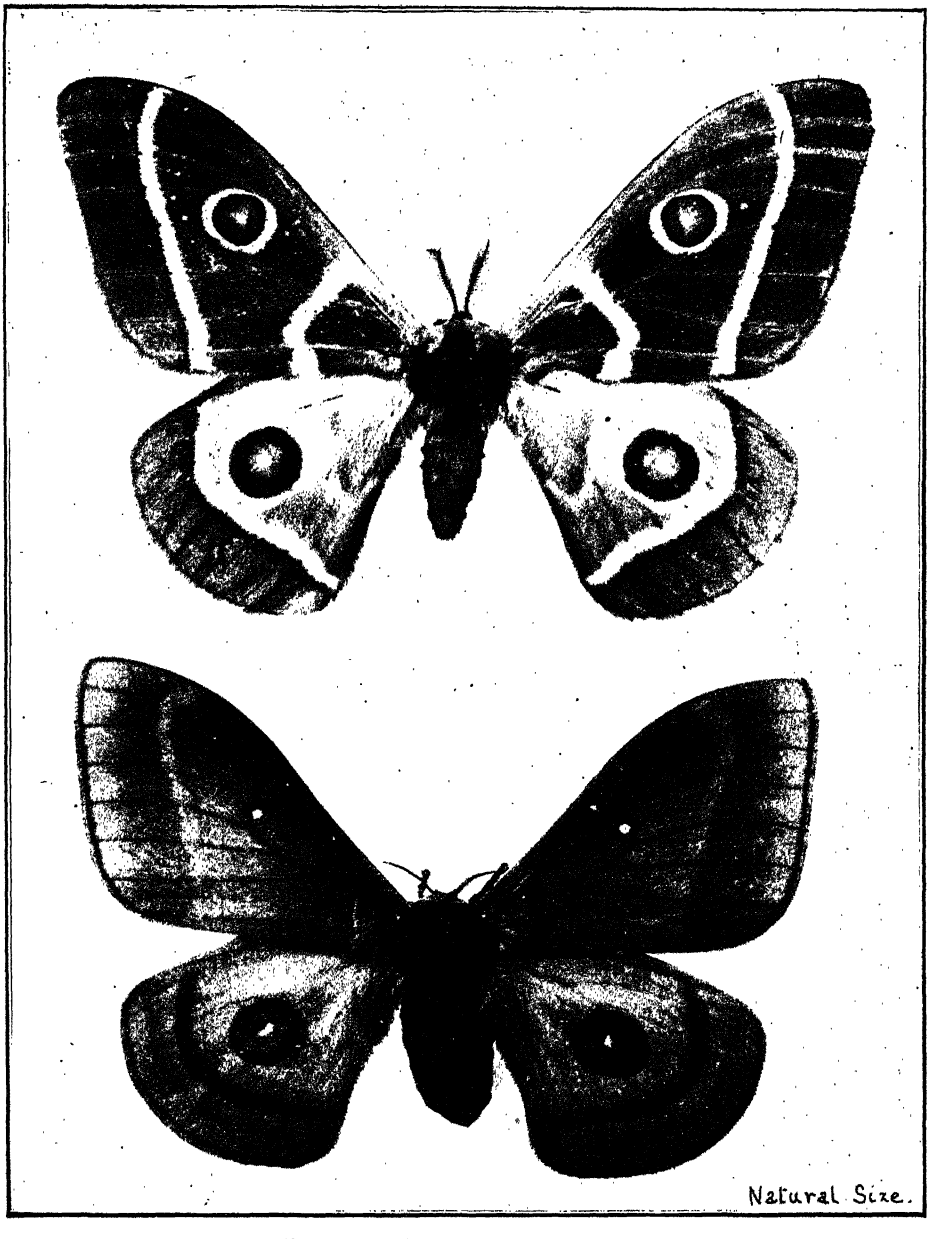


Plate VI. Nudaurelia sp.—Male.
Gonimbrasia hyperbius, *Westw.*—Female.

This tree (*Brachystegia sp.*), called Umnondo in Matabeleland, is very like the Musasa in appearance, but its leaves are of more regular and oval shape, and are not shiny. The caterpillars are styled *madora* by the Mashonas, who esteem them as a very tasty article of diet, and will walk long distances to procure them. They are rather restless in captivity, and should be kept in a large box or tin. I may mention that this moth is very similar in colour and pattern to a *Nudaurelia* (*N. belina*) found in Matabeleland, and also in the Transvaal, Orange Free State and Natal.

Undoubtedly one of the most beautiful of the South African Emperor Moths is *Epiphora mythimnia*, specially remarkable for the elegant shape of its wings and for the very large transparent spaces in the fore- and hind-wings. This is a good-sized Emperor Moth, expanding 5 or 5½ inches across the wings. It is found occasionally, but not often, in Natal and the Transvaal, and it has been captured once or twice in Matabeleland. The fore-wings are violet-grey, thinly covered with very short white hairs in the basal and median area; the median area is bounded externally by a broad, curved, white band; the tip of the wings is light brown, and the outer margin olive-green. The transparent spaces in the wings are bounded by white and yellow and black, and these spaces are oval in the hind-wings, and longer and narrower in the fore-wings. The hind-wings are coloured much like the fore-wings, and close to their outer margin is a very pretty irregular band of black and yellow. Near the tip of the fore-wings is a small round black spot. In shape, pattern and colour this moth is quite unlike any other South African *Saturniid*. I have never found it myself, but possess a fine example of the male captured near Durban.

Of the small Emperor Moths that occur in Southern Rhodesia, three species are figured in our illustrations. The first of these is *Ludia delegorguei* (Plate V.), a pretty little moth of only 2 to 2½ inches wing expanse. The wings exhibit various shades of grey and brown, with yellowish-green outer margins. The upper portion of the hind-wings is crimson or carmine; the hind-wing spot is orange, with a grey lunate mark in the centre; and towards the tip of the fore-wings is a very singular transparent space, shaped like a hieroglyphic. The caterpillar of this moth is light yellowish-green. Down

the middle of the back is a broad black band of lozenge-shaped spots almost contiguous to each other, and on each side is a slightly narrower band of smaller spots. This caterpillar is thickly coated with long, white, upright hairs, which cause a burning sensation if touched by the hand. It feeds in Mashonaland on a small upright plant with purple flowers and small lanceolate leaves. The natives dry these leaves, and use them as a substitute for tea.

Copaxa flavinata (Plate IV.) is a plain yellow moth with reddish-brown wavy bands and spots. It is common on the Natal coast, but was not known to occur in Rhodesia till quite recently. I had the good luck to take the first specimen, near Salisbury, on the 27th of last November. Within a week of that date Mr. Jack captured a second specimen in the same locality.

The very tiny *Saturniid* (it expands only 1¾ inches across the wings) known as *Decachorda pomona* (Plate V.) is also found, though rarely, in the neighbourhood of Salisbury. It is claret-coloured, with a narrow dark band across the fore-wings. This is probably the smallest of Emperor Moths, and it doesn't look at all like a *Saturniid.*

Heniocha flavida is a much larger and prettier moth, of grey and white colour, with large black and white ocellate marking on each wing. It has been found occasionally in Matabeleland and near Salisbury, but seems to be rare in Rhodesia. Years ago I used to find the beautiful caterpillar on mimosa trees in the Cape Colony. This caterpillar is emerald green, and studded with silver warts or tubercles of pyramidal shape.

A number of other *Saturniidæ* have been recorded from Matabeleland or Mashonaland; but I must pass them over with a very brief mention. Three of these, common about Salisbury, are small, though interesting species. The first is *Cyrtogone bilineata*, with very dark purple fore-wings, which expand from 2½ to 4 inches. The hind-wings are more or less flushed with carmine in the basal and median areas. The handsome caterpillar feeds on the Musasa and Munondo trees. It is banded with black, yellow and crimson, and furnished with long white or light yellow hairs, which are worse than stinging nettles to touch.

Next comes *Goodia kuntzei*, with a wing expanse of only $2\frac{1}{4}$ or $2\frac{1}{2}$ inches. The wings are light reddish-brown or brick-red, with a few small dark brown markings and a light patch in the cell of the fore-wing. At the end of the cell is a dark lunate mark. The caterpillar, another Musasa feeder, is light green, with three dark bands down the body, and covered, but not very thickly, with white or grey hairs. It too is an unpleasant worm to handle.

Then we have *Pseudaphelia apollinaris*, a most curious diurnal moth, which looks remarkably like a large white butterfly, and when on the wing would certainly be mistaken for a *Pierid* were it not for its weak and uncertain flight. The wings are white (very rarely yellow) with black nervures, a dusky patch at the tip of the fore-wing, and black hind-marginal borders that enclose a number of small, round, yellow spots. In the fore-wing there is a small ocellate mark, consisting of a yellow spot enclosed by a black ring. The hind-wing has a similar but smaller ocellate mark. The caterpillar of this moth is gregarious, and very aberrant in form. Its colour is black and white above and laterally, and yellow underneath.

Among the *Saturniidæ* recorded from Matabeleland, but not captured hitherto in Mashonaland, are *Nudaurelia arata*, a rather pretty yellow species, with red ocellate markings and greyish-purple bands; *Usta terpsichore*, a grey and white moth, of moderate size, and with black and yellow ocellate spots on all the wings; *Gynanisa maia*, something like *G. semialba*, but much smaller, and not nearly as handsome; three small and very plainly-coloured moths, whose names are *Cirina similis*, *Pachypasa pithyocampa* and *Trichopinthia monteiroi*; and lastly, a very large and beautiful *Saturniid*, mostly of a bright yellow colour and apparently a *Bunœa*, whose capture has been recorded from Umvuma.

As I remarked in the beginning of this article, careful search for these Emperor Moths, combined with the rearing of caterpillars, is almost certain to be rewarded, in Mashonaland at any rate, by the discovery of new or very rare species. In support of this it is enough to state that I have just bred, from hairy caterpillars of very ordinary appearance, some specimens of a most curious and extremely pretty *Saturniid*,

belonging to the genus *Bolocera*, which is certainly new to South Africa, and very likely new to science. Anybody who starts collecting these moths, or any other moths, in Rhodesia, is sure to find the pastime a most healthful and fascinating one. No better service could be done to boy or girl in this land than to give them a taste for collecting, classifying and studying the life-histories of the insects with which Rhodesia abounds.

Let me state in conclusion that the excellent figures by which this article is illustrated are from photographs taken by Mr. R. W. Jack, of the Entomological Branch of the Agricultural Department.

Bacon Factory.

The following circular was issued on 15th December, 1916, by the Acting Commercial Representative of the British South Africa Company:—

"Referring to my Circular No. 2, of the 23rd March last, notifying a temporary increase in the price payable for pigs to meet the conditions then prevailing, I have to inform you that it has now been decided to revert to the original prices.

On and after the 1st January, 1917, the prices payable for pigs supplied to the Bacon Factory will therefore be as follows:—

First Class Bacon Pigs	4½d.	per lb. live weight
Second Class Bacon Pigs ...	4d.	do.

delivered at the Factory, Salisbury.

Cultural Notes on Rhodesian Crops.

By J. A. T. WALTERS, B.A., Assistant Agriculturist.

ONIONS.

Onions may be grown in a variety of ways either as a summer or as a winter crop. In the former case they must be planted at such a time that they reach maturity after the rains are over, and the dates will depend upon the variety used. In Rhodesia the crop is almost exclusively grown in winter, and although the following notes apply to both seasons as far as treatment is concerned, the dates refer to the winter grown crop only. As a winter crop, it will of course be grown under irrigation, although it is sometimes possible to grow the crop successfully on a moist vlei provided the texture of the soil and its fertility are satisfactory.

Soil and Manuring.—With the exception of heavy black soil and light sandy soil, any soil is suited to the cultivation of the onion. It is essential, however, that the land selected be highly fertile. No crop requires or responds to manuring as much as the onion crop. Well rotted stable or kraal manure should be applied to the land at the rate of 10 to 15 tons per acre, and a further light dressing of any complete artificial fertiliser would be advantageous. American growers recommend the use of hen manure for this purpose on account of its high fertilising value, and when potash is scarce or unavailable, a dressing of wood ash up to two tons per acre will go far to remedy this defect. The land should be prepared by ploughing after the previous winter crop has been removed and should be allowed to lie fallow during the summer months, the weeds being frequently disced or harrowed in. A subsequent cross ploughing before planting is advisable. The same land may be used for the onion crop for

several years with advantage, provided the manurial dressings above referred to are applied annually.

Seed Bed.—The seed beds should be sown in March or April, and as the young seedlings are sensitive to sunburn, they should be covered over with a light grass shade. The seeds should be sown about ½ inch deep in rows 3 to 4 inches apart. Harden the young plants off gradually so that they may be ready to plant out in about six to eight weeks' time from the date of sowing; 1¼ ozs. of seed will sow a bed 6 ft. by 3 ft., and will produce up to 10,000 plants. One acre needs 180,000 transplants, and for this 1½ lbs. of seed are required, and a seed bed 3 ft. wide by 110 ft. long.

Transplanting.—In about six to eight weeks' time from the date of sowing in the seed bed, the young plants will be ready for transplanting. They will then be from ¼ to ⅜ of an inch in diameter. When lifting from the seed bed the green tops should be cut off about half-way down, and any long rootlets should be trimmed. They are set out on the land in rows 12 to 15 inches apart, with 3 inches between each plant. The young bulbs should be covered with about 1 inch of soil. This is perhaps best done by preparing rows about 2 inches deep in the land and placing the plants in these rows at the right distance apart.

Harvesting.—The time required for ripening as a winter crop will vary from season to season. The onion has reached maturity when the tops fall over and wither, and when the necks begin to turn yellow. The whole crop should then be lifted, gathered into small heaps, and left to cure for a week or ten days. Any unripe plants will mature in this period. The whole crop should then be removed to a sheltered place, taking care that the bulbs are perfectly dry on the outside. The bulbs should be handled with care so as to avoid bruising, and any that are damaged should be removed.

Irrigation should cease as soon as the first sign of ripening appears, otherwise regrowth will result. After the curing, the tops which have died away may be twisted off, and the bulbs may be stored or put on the market. The essentials for successful storing are thorough maturity and curing. Ill cured bulbs are apt to sprout. Ventilation and coolness are necessary in the store.

Varieties.—Differences in varieties relate either to colour, to the time required for maturity, or to keeping qualities. The favourite in this country, mainly on account of its keeping qualities, is the Natal Red variety, which is listed by most of the leading seedsmen. Another popular white variety is the Silver King (possibly the same as the Silver Queen or White Queen), while Australian Brown and Red Bermuda are occasionally grown.

Production of Seed.—Practically all the onion seed used in this country is imported, and prices vary from 16s. to 33s. per lb. The question of growing our own seed is worthy of attention. This can be done as follows:—A number of the cured bulbs are kept over for planting in December. Furrows are made about 5 inches deep and from 1½ to 2 ft. apart, in which the bulbs are planted every 6 inches. As the seed ripens the seed pods and the ends of the stalks turn yellow, and very frequently the pods burst open. When this occurs, the heads should be cut off and allowed to dry. If the ripening is uneven, the seed heads must be picked over several times. The seeds, after being thoroughly dried, are then cleaned and winnowed. The final cleaning may be done by immersing in water, when the light, useless seed will float on the surface and can be removed. The heavy plump seed should again be thoroughly dried before being bagged for the market.

BUCKWHEAT.

Buckwheat is the quickest maturing crop in Rhodesia, and for this reason it can be sown as late in the season as the middle of February, often providing use for land which would otherwise remain idle after the failure or removal of another crop. An attempt made at the Agricultural Experiment Station, Salisbury, to grow a crop from a sowing on the 4th March, 1916, failed, but in a season of late rainfall even this date might not be too late.

Soil.—Practically any soil is suited to this crop, even sandy soils yielding a fair return. Poor sand should, however, be avoided, also heavy vleis where the water is apt to stand. No special preparation is necessary, and fertilisers or

manures are not usually applied to this crop. A good preparatory cultivation is, however, to be recommended, as no cultivation is possible after the crop has been sown and harrowed in.

Seeding.—The seed is usually broadcasted, and up to 30 lbs. of seed per acre are required. It can, however, be drilled with advantage, when 12 to 15 lbs. of seed would be sufficient for an acre. The seeds germinate quickly, and the young plants appear above ground in a few days. For this reason buckwheat is sometimes added in small quantities when slow germinating seeds, like mangels, are sown, in order to indicate the position of the rows so that cultivation may be started early.

Varieties and Yields.—The variety usually grown in this country is the Japanese or Common variety. This yielded over 10 bags of grain per acre in 1913, after a previous crop of vetches, and 1,840 lbs. per acre in 1914, after cowpeas. Owing to the long drought in 1915-16, the best yield was only obtained from a February sown crop, which gave 600 lbs. per acre. The average yields in this country are considerably lower than those recorded above, but the crop is rarely given the care and attention it is entitled to. Other varieties tried include the silver hulled buckwheat, Tartarian and grey. In no case have the yields come up to those obtained from the Japanese variety, and of late years their use has been entirely discarded.

Harvesting.—The crop is ready for harvesting in about nine to ten weeks from the date of sowing. Considerable loss is usually experienced in harvesting, partly because the flowers ripen unevenly, and partly because the seed sheds so readily. The plants should be cut or pulled by hand when the top seeds are quite ripe and some of the flowers are still in bloom. This should be done preferably in the early morning, while the plants are still damp from the dew, or on dull, cloudy days. They should then be stooked in an upright position in the field, and allowed to remain for a few days, when a great many of the unripe seeds will fill out. The seeds should be beaten out on the land, or the plants should be carted in sacks to avoid loss of seed through shedding. When the straw is well cured it makes good fodder, and if

spread on the land decays rapidly, and provides good humus for the soil. The blossoming period usually lasts three to four weeks, and as the nectar content of the flowers is very considerable, it is a good bee plant.

Composition.—The composition of the grain is as follows. An analysis of maize grain is also given for comparison:—

	Buckwheat.	Maize.
Water	12.6 per cent.	11.0 per cent.
Ash	2.0 ,,	1.5 ,,
Protein	10.0 ,,	10.5 ,,
Fibre	8.7 ,,	2.1 ,,
Carbohydrates ...	64.5 ,,	69.6 ,,
Fat	2.2 ,,	5.4 ,,

Uses.—Buckwheat is very largely used in America as an article of human food. It is occasionally met with in this country in the form of cakes and porridge, for which it is admirably suited, but its principal use will be as a poultry and stock feed to supplement or replace maize, and in the case of pigs it is highly recommended in the final stages of fattening to improve the quality of the pork.

Marketing Cattle in the United States.

We are indebted to Mr. J. Hubert Fleming, of the Rhodesdale Ranch, for the following interesting particulars, extracted from American official sources by Messrs. Clay, Robinson & Company, meat salesmen of Chicago. They are instructive in view of the proposals on foot in Rhodesia for stock yards, municipal abattoirs and a canning factory, and the suggestion of co-operation in the marketing of live stock:—

"Marked variation in methods of marketing meat animals in different sections of the United States and in methods of marketing different classes of animals in the country as a whole has been found by specialists of the United States Department of Agriculture from a survey of the live stock marketing conditions of the country.

"The three general methods of marketing found to be in most common use are:—Shipping to the large centralised markets, selling to local butchers and packers, and the sale of farm-prepared meats to dealers or consumers. The bulk of the animals from the central States, it was found, is sold through the centralised markets, while some form of local marketing predominates in the extreme eastern, western and southern sections.

"Co-operative associations of cattle raisers are becoming an important factor in marketing, the report shews. Seven hundred and fifty organisations which market cattle in a co-operative way now exist in fifteen States. Four hundred and thirty of these organisations are primarily live stock shipping associations. The greatest activity of this sort was in Minnesota, where 215 co-operative live stock shipping associations are located. The department specialists declare that these associations bring greater returns to the farmers because of the reduction of marketing expenses and the realisation of the prevailing prices at the centralised markets, and that they are also valuable because of their educational features.

"The system of centralised live stock markets in the United States is the largest single factor in the marketing of meat animals. It is noteworthy that this system is peculiar to the United States, no other country having developed such markets for their live stock. Not only is live stock sold for slaughter at the centralised markets, but a large proportion of stocker and feeder cattle also passes through these market centres.

"The chief outlet for food producing animals in this country, the study discloses, is wholesale slaughtering and meat packing. Such industries usually are associated with the great centralised markets. More than 1,200 slaughtering and meat packing establishments were operating in the United States in 1914, and turned out products worth 1,651,765,424 dollars. The specialists report that one of the striking features of the industry is the concentration of ownership. Packing establishments buy directly from the producer in California to a greater extent than in any other State or section. This practice, which in the opinion of the specialists will continue to be important in those parts of the country remote from centralised markets, is most characteristic of the western group of States in general. There is a decided difference of opinion among producers, marketmen and packers as to the effects of this practice in sections supplied with central markets on the general market prices of live stock and on the prosperity of cattle raisers.

"Municipally owned or controlled abattoirs are becoming increasingly important in the local marketing of live stock, the report shews, and are displacing rapidly the old type of slaughter-house. Public abattoirs have been established in twenty-two cities and thirteen States. Local conditions should determine whether or not a city should build its own abattoir, and a thorough examination of conditions, therefore, should be made before definite action is taken."

Wheat Production in Southern Rhodesia.

The profitableness of the wheat crop and the importance of producing our own supplies in this Territory are very strikingly shewn by the great advance made last year. Whereas in 1914-15 only 321 acres were sown to summer wheat, this had increased to 866 acres in 1915-16. At the present juncture, when the wheat supply in South Africa is likely to be short and the Imperial demand is great, it behoves every farmer to give this matter of wheat production his serious attention. By far the greatest quantity of our wheat is produced as a winter crop. Where irrigation can be practised, or where the soil remains moist well into the winter, as it does in the case of so many of our wet vleis, the possibility of growing a crop of winter wheat presents itself. It is more than likely, if the abundant rains that have fallen up to the present continue, that many vleis which were too dry after the scanty rainfall last year could be laid down to wheat during the coming season. Winter wheat is generally sown during the months of March, April and May. In this way the crop escapes the rust infection that is likely to attack the summer grown crop, and consequently almost any variety of seed may be sown with a fair chance of success. The variety known as Early Gluyas has, however, shewn considerable advantage over the others in most cases, although Wol Koren, Klein Koren, Els Koren and others have frequently been grown with good results. Seed of the Gluyas variety is usually obtainable from any of the leading seedsmen, and one bag will suffice to sow five acres broadcast, or about seven to ten acres drilled.

The wheat crop is easy of treatment under the conditions named above. Land under irrigation needs careful preparation in the way of ploughing and harrowing during the summer, but once the plants are up, all cultural operations

cease. In both cases the principal aim of the farmer should be to get the land into a good state of tilth, so that the seed may be received under the best conditions. If a preparatory ploughing has been possible in October or November the task will be greatly facilitated. The use of the roller, particularly in soils of loose texture, is strongly recommended, but it should never be employed if the state of the soil is so moist that the weight of the roller will pack and harden it. In both cases experience has shewn that the application of artificial fertiliser at the rate of about 100 lbs. per acre of any complete article will greatly increase the yield and profit to be made out of this crop.

In present circumstances, with high prices ruling, it becomes the farmer's duty, both to himself and to his country, to make a particular effort to put every available acre under wheat, and any assistance that can be rendered by the Department of Agriculture in the way of advice is at his disposal.

Hints on Explosives.

By W. M. Watt, Agricultural Engineer.

In the strenuous and stirring times we are enduring to-day the term "explosive" has mainly a military value, but the time was when its disruptive properties were under the control of the miner and the engineer rather than the soldier. Nevertheless, it seems justifiable, even at the present time, to give a few hints, cautionary and otherwise, to the farmers of this Territory who have occasion to stock, store and make use of explosives.

Gunpowder, the first explosive, was invented in the 13th or 14th century, and consisted, as it does to-day, of a mixture of saltpetre, charcoal and sulphur. It was primarily used for military purposes, but from the miner's and engineer's point of view was found in many cases to be unsatisfactory, and in fact was not tried for blasting purposes until the 17th century.

When gunpowder is damp it is useless until dried again, and consequently is of little or no value where blasting has to be carried out in damp or wet situations. It has, however, an advantage over what are termed high explosives, in having, owing to the comparative slowness of the expansion of its gases on ignition, a rending effect instead of a shattering effect, which latter in some circumstances might be preferable. The rending action of gunpowder was at one time a very valuable asset to the coal miner in that it produced large blocks instead of the small ones that would have been obtained by the use of high explosives, but this advantage has been considerably altered by the invention of other low explosives.

The writer has used gunpowder with advantage in rending hard clay soils and soft rocks which were too hard to pick

and in which high explosive compounds would have been of no assistance.

In using ordinary gunpowder no detonator is necessary, as it can be and generally is, in common with most other explosives, ignited by a spark from the fuse, but if ignited by a suitable detonator its relative disruptive power may be multiplied by four.

The following table extracted from "Molesworth's Pocket-Book of Engineering Formulæ" may prove of some interest:—

Relative Effect of Explosives—Gunpowder simply exploded equals 1.

Explosive.	Simply exploded.	Detonated.
Gunpowder	1.00	4.34
Picrate of Potash	1.82	5.31
Picric Acid	2.14	5.50
Guncotton	3.00	6.46
Nitro-Glycerine	4.80	10.13
Fulminate of Mercury	—	9.28

Cartridges of compressed quicklime are, when wetted, capable of disrupting rock, and may be employed in mines liable to "fire-damp" where safety lamps of the "Davy" or electric type have to be used, and even in open situations. Another homely remedy where only one or two large boulders have to be removed is to lay a fire over and around them, and to let it burn until the boulders become so heated that when cold water is poured upon them they are disrupted by the contraction due to the sudden alteration of temperature. This method would apply where the amount of rock to be removed did not justify in itself the purchase of a "true" explosive with its necessary concomitants, such as fuse and detonators, *e.g.*, the removal of a few large boulders in a road-way, which it was not ordinarily to be expected could be removed by a pick and crow-bar.

Before discussing the composition and other properties of high and low explosives (other than gunpowder) it seems advisable at this stage to point out the value of the disruptive work that can be done by the aid of heavy hammers, rock-

wedges (in assorted sizes and tapers), crow-bars and the ordinary pick-axe. A rock surface apparently solid will generally, if struck a few blows with a heavy hammer, say from one to twenty pounds (if the latter number has to be exceeded it will prove good exercise for somebody), shew a crack here and there. If into these fine pointed rock wedges are driven, if necessary to be replaced later on by stouter wedges as the finer ones upon being driven open out the cracks, the rock may be so fractured that it can be removed by the help of the crow-bars and picks.

Probably the explosive best known is dynamite. Dynamite is a compound of nitro-glycerine mixed with an absorbent called kieselguhr, an infusorial earth found principally in Germany and Scotland. Before this absorbent was found the use of the pure nitro-glycerine compound, which has much greater explosive power than that of ordinary gunpowder, was prohibited in Great Britain, and is now in its pure form never used, although it forms the base of nearly all explosives, and their names are legion.

Blasting gelatine, which is an explosive of still greater power than dynamite, was invented by Alfred Nobel, and patent rights obtained in 1875. It is a mixture of nitro-glycerine and collodion, and has largely supplanted the use of dynamite where hard rock has to be dealt with.

In an article such as this it is hardly necessary to enumerate or explain the composition of all explosives, but such well known ones as gelignite, ballistite and cordite may be mentioned before passing on to the subject of the general uses to which explosives are put.

The disruptive power of explosives is utilised for many purposes, and among these, so far as the object of this article is concerned, the following might be mentioned: (1) Removal of solid rock, fissured rock, stiff clay, etc., that may be necessary for the construction of engineering works; (2) breaking up stiff sub-soils in orchards or other cultivated lands; and (3) stumping.

This article deals more or less exclusively with the first. As to the other two uses, it is a moot point whether high



Blasting by Electricity, Odzani Furrow.

explosives have proved an economical success. At the same time it should be stated that where time is a consideration their employment has met with some success.

As will be seen from the table given above, the power of any explosive depends very largely on the use of a detonator. Detonators were invented by Nobel in 1864, and consist of a small copper tube with a capping of fulminate of mercury. The percussive power of these detonators is variable, and the makers have them regulated so that they may best deal with whatever explosive is supplied, and the question as to what detonators should be used is one which can best be answered by the makers or their agents.

Explosive cartridges are made of various diameters and lengths, varying from $\frac{3}{4}$ inch to $1\frac{7}{16}$ inch diameter, and from $3\frac{3}{8}$ inches to 6 inches long, and the size, particularly the diameter, should be carefully specified when ordering. The net weight of a case of explosive cartridges is 50 lbs., and the gross weight of the case varies from about 60 to 70 lbs.

Fuses are generally made of waterproofed material, and when using them in damp or wet situations, after their insertion in the detonator, the junction should be sealed with grease or wax so as to prevent water reaching the fulminate of mercury in the percussion cap or the lower end of the fuse.

Detonators are generally packed in sawdust, which should be shaken out by hand, but on no account should any attempt be made to remove the sawdust by means of a pin or other similar tool. The slightest friction is sufficient to detonate the fulminate of mercury in the cap, and its explosive power is quite sufficient to blow one's hand off at least. Never store detonators with dynamite or whichever other base explosive is being employed. Dynamite, unless frozen hard, is in itself comparatively harmless, but if accidentally detonated, is, to say the least of it, highly dangerous. If frozen hard, the dynamite should be softened by placing it in a pan floated in a basin of boiling water until plastic, but this operation should never be conducted near a fire.

A very common source of danger is the foolish habit of obtaining a union between the detonator and the fuse by biting

the detonator. All firms supplying explosives provide nippers for this purpose, and their use would have saved many human jaws. After the detonator has been shaken free of its sawdust, the fuse should be inserted by a push—not a twist—and by the use of proper nippers applied near the open end of the cap; the copper casing should be squeezed so as to grip the fuse. If this operation is carried out too low down there is a danger of the compression causing the fulminate to explode.

When a large quantity of explosives is likely to be required for early use, it must be stored in a suitable magazine situated preferably not less than 200 yards from the nearest habitable building. In this connection I quote clause 136 of the Mining Law of Southern Rhodesia:—

> "No person shall construct underground a magazine for the storage of explosives (as may from time to time be defined by law) nor erect a magazine upon the surface of the ground without having previously obtained permission in writing from the Mining Commissioner so to do. Every such magazine shall be erected subject to the following conditions—
>
> (1) it shall be placed at a distance of at least one hundred yards from any occupied building, public road, bridge, aqueduct or railway;
>
> (2) the walls thereof shall be of suitable and substantial construction;
>
> (3) the roof thereof shall be as light as possible, but fireproof;
>
> (4) it shall be provided with a reliable lightning conductor;
>
> (5) it shall have no windows;
>
> (6) the ground for a distance of fifty yards round the walls thereof shall be kept clear of bushes and grass.
>
> Non-compliance with any of the provisions of this section shall render the registered holder of the location or site on which the magazine is situated, or his agent or manager, as the case may be, liable to the prescribed penalty."

In blasting by simple ignition, the number of explosions should be carefully noted and compared with the number of charges fired, and in the event of a misfire no person should approach the site for a period of at least ten minutes. When the misfire has been discovered, on no account should any attempt be made to remove it by extracting the cartridge, but a second hole should be drilled about 9 inches away alongside it and a fresh charge inserted and fired in this new hole, which will generally have the effect of detonating the misfire.

Where fairly large bodies of rock have to be broken, great advantage is obtained by igniting the charges simultaneously by electricity. High and low tension batteries are used for this purpose, but the low tension battery is the more suitable for tropical climes such as ours. The illustration of a blast shewn in this article was ignited by a low tension electric battery.

As an example of the strange uses to which explosives are put, I give an extract from a catalogue of Nobel's Explosives Co., Ltd., headed "Nitro-Glycerine as a Medicine":—

"It is not safe to take nitro-glycerine in large doses.

"A farm labourer in America, who was reported to have drunk a small bottle for a wager, was subsequently found by the roadside dead and frozen. The body was taken into an outbuilding and placed near a stove in order that it might be thawed, but the nitro-glycerine inside exploded, and the whole building was wrecked."

Pound Fees.

Complaints have reached the Administration that in certain cases poundmasters have made what appeared to be excessive charges for stock that had been in their care. These cases appear to be exceptional, both in respect to the large number of cattle affected and the long period they were left in the pound.

As a result of these complaints, the working of the pound system throughout the country has been enquired into, and it has been determined to establish an approximately uniform scale of pound fees and charges to be adhered to in every district, subject always to such change as the law allows where special and good reasons exist for varying them.

Below we give schedules of the fees and charges now adopted at all pounds other than those under the control of municipalities, where special arrangements exist.

SCHEDULE B.—RATE OF MILEAGE.

For all animals, whether one or more, per mile, going to the pound, 6d.

SCHEDULE C.—TRESPASS ON CULTIVATED LAND, ETC.

Description of animal.	If land enclosed with sufficient fence.	If land not so enclosed.
Horses, cattle, camels, ostriches and pigs, per head	1s. 6d.	9d.
Goats, per head	6d.	3d.
Sheep, per head	3d.	1d.

SCHEDULE D.—TRESPASS ON UNCULTIVATED LAND.

Horses, cattle, camels, ostriches and pigs, per head	6d.	3d.
Goats and sheep, per head, if under 300 in number	1d.	½d.
Goats and sheep, per head, if over 300 in number, then for every goat or sheep in excess of 300, per head	½d.	¼d.

SCHEDULE E.—POUND FEES.

Horses, cattle, camels, ostriches and pigs, per head, 1s.
Sheep and goats, per head, 1d.

SCHEDULE F.—SUSTENANCE FEES.

Horses, cattle, camels, ostriches and pigs, per head per day, 9d.; after ten days, 6d.
Sheep and goats, per head per day, 1d.; after ten days, ½d.

SCHEDULE G.—FEES FOR ANIMALS TO BE SEPARATELY HERDED.

For every stallion, per diem, 1s. 6d.
do. ostrich, do. 1s. 6d.
do. camel, do. 1s. 6d.
do. bull, do. 1s.
do. boar, do. 9d.
do. sheep-ram, goat-ram, or other separated animal, per diem, 3d.

For the information of the public, attention may be called to the following points:—Pounds are established for the convenience of stock owners and usually at their request. The cost of working the pound system does not fall upon the general public, but has to be covered by fees and charges collected from stock owners who are unfortunate enough to lose stock and have to make use of the pounds to recover them.

The difficulty that confronts the Administration is to fix a scale of charges sufficiently high to attract men to undertake the duties of poundmasters, and at the same time for the charges not to be so high as to impose an excessive burden on the stock owners for whose benefit the pounds exist. The schedules given above have been devised with a view to bridge this difficulty.

When very considerable amounts are demanded by poundmasters, the reason must be either that a large number of stock have been impounded, or that stock have been a long time in the pound, or both. Except in special cases where stock may have strayed a great distance, the responsibility must as a rule rest on the stock owner himself. It is not conceivable, for instance, that 50 or 100 head of cattle can be lost for several days and not traced, unless there is negligence

on the part of the owner or his agent. Again, when we hear of cattle being in a pound unclaimed for 30 or 40 days, some slackness on the part of the owner may be presumed, and in some cases we understand that the poundmaster has been prevented from communicating with the stock owner because his beasts were branded so indistinctly that they could not be identified. The reduced rate after the tenth day (Schedule F) aims, however, at lessening the hardship.

The difficulty of obtaining permits to move stock to a pound within the period prescribed by law must exist as long as the system of movement of cattle only under permit continues in Rhodesia, but it has not in the past proved an insuperable obstacle and need not become one in the future. Poundmasters have been vested with authority to issue permits for the removal of stock within the limits of their own cattle transport areas to and from the pound wherever there is no cattle inspector or other permit issuing official available.

List of Pounds and Poundmasters in Southern Rhodesia as at 31st January, 1917.

Pound.	Poundmaster.
Salisbury	A. Ackermann.
Nyamandhlovu	L. Green.
Inyati	H. Rochester.
Bulawayo—Municipal.	
Umzingwane	J. H. Whitmore.
Magholo Farm (Insiza)	Alfred Allan.
Stodon Farm (Bulalima - Mangwe)	P. M. Windiatt.
Pagati Farm (Matobo)	J. L. Mee.
Enkeldoorn	J. W. Cumming.
Gwanda	C. F. G. Sterling.
Belingwe	A. B. Inverdale.
Hillview Farm (Gwelo)	B. J. Ingle.
Hartley (Newmarch Farm) ...	J. de L. Nimmo.
Que Que	E. J. Ross.
Selukwe	A. E. West.
Gatooma	J. J. Bowles.
Beatrice (Nengwa Farm) ...	J. Fick.
Marandellas	G. Bourne.
Bindura	A. M. Robb.

Pound.	Poundmaster.
Victoria	J. Johnstone.
Garth Farm (Bulalima - Mangwe)	Mac. W. Ingram.
Infiningwe Farm (Insiza) ...	R. P. McDonald.
Leighton Farm (Bubi)	J. H. Bailey.
Rusape	N.C.O. i/c B.S.A. Police.
Liscard Farm (Insiza)	J. E. Penny.
Matopo Vale (Fort Usher) ...	N.C.'s Clerk (temporary).
Umvuma	P. C. Owen.
Gwelo—Municipal.	
Wankie	N.C.O. i/c B.S.A. Police.
Iron Mine Hill (Irving Farm)	T. G. Irving.
Balla Balla	T. A. Russell.
Sinoia	T. Bradfield.
Makwiro (Cromdale Farm) ...	F. R. McLellan.
Plumtree (Brantwood Farm)	W. Murgatroyd.
Shamva	C. R. Fiander.
Alphaeton Farm (Christmas Pass)	G. W. H. Ogilvie.

Salisbury Fat Stock Show

BLOCK TEST RESULTS.

The Salisbury Christmas Fat Stock Show (Messrs. Whitfield & Co.) was held on 18th December, 1916. It was formally opened by the Director of Agriculture, who in his speech dwelt upon the more important live stock events of the year. He expressed confidence in the progress of the meat canning industry, which he believed would before long become an established fact. The question of providing cattle sale yards in Bulawayo and Salisbury was being vigorously handled. The erection of such yards would increase the facilities for marketing cattle, particularly in the direction of making control possible under quarantine conditions. Reports upon the experimental export of Rhodesian cattle to London were favourable and augured well for that branch of the industry. Efforts had been made to get the Johannesburg market for slaughter cattle thrown open for Mashonaland in the same way it was for Matabeleland, but so far without success. At the same time Mashonaland was benefiting indirectly by the present arrangement, which tended to relieve local congestion.

Accounts of the sale, which was very successful, have already appeared in the local press, and we now publish a table giving the results of the Block Test Competition. A number of animals of excellent quality competed, and, had it been possible, at least four would have been slaughtered. As it was, the hot weather rendered the disposal of so much meat in one day by one buyer impossible, and out of consideration for the purchasers of the selected animals, only two, obviously the best, were slaughtered. The percentage of carcase to live weight, namely, 64.4 per cent., shewn by the Aberdeen Angus-Angoni beast, is very high for this country, and this beast

would have won by a considerable margin but for the fact that his fore-quarters, which included eight pounds of hump, were so much in excess of his hind-quarters. In these competitions it is noticeable that this point always tends to improve the position of the high grade animal as compared to a first cross beast, thus shewing that by continued judicious grading one approaches nearer to the kind of carcase required for the Home market. We need scarcely point out that an ideal beast should have his greatest weight in the hind-quarters.

FAT STOCK SHOW.—BLOCK TEST.

Beast.	Owner.	Breeder.	No. of teeth up.	Live weight.	Dead weight.	Percentage of carcase to live weight.	Fore quarters.	Hind quarters.	Proportion of hind to fore quarters.
				lbs.	lbs.		lbs.	lbs.	
High-grade Shorthorn	Duncan Black	E. A. Hull ...	Full mouthed	1,470	896	60·9	439	457	Hind quarter 18 lbs. in excess
Aberdeen Angus-Angoni cross	J. E. Dawson	C. C. Macarthur	Six ...	1,250	806	64·4	415	391	Fore quarter 24 lbs. in excess

Points for which marks were given.	Possible marks.	High-grade Shorthorn.	Aberdeen Angus-Angoni cross.
Proportion of carcase to live weight	50	45	50
Weight for age	20	17	20
Quality of meat	20	18	20
Proportion of fore quarter and less valuable meat to hind quarter and more valuable meat	10	7	Nil
Totals	100	87	90

Correspondence.

BEEF FEEDING EXPERIMENT No. 2, GOVERNMENT EXPERIMENT FARM, GWEBI.

We append a reply by Mr. R. C. Simmons to the points raised by Mr. H. D. Rawson on this subject in our last issue.

Referring to Mr. H. D. Rawson's criticism of the above experiment, his remarks have necessitated a very careful survey of the figures and statements on which the conclusions were based. At the outset I would emphasise the fact that the particulars given are intended to be examined by every farmer for himself, altering to suit his individual case any figures which differ from what his experience shews him to be correct for his own case. I would remind Mr. Rawson and other readers that attention was drawn to this point in the *Journal* (February, 1916, page 3) when dealing with the results of the initial experiment. All efforts to apply the lessons of these experiments are to be welcomed.

Dealing first with the cost of production of the various feeds; after consultation with those responsible for growing the crops at the Gwebi farm, I can find no reason to alter them, except in the case of maize, oat hay and ground nuts. With regard to maize, if Mr. Rawson will refer to page 661 of the *Journal* for October, 1916 (the same in which my article in question appears), he will find that the cost of certain experiments with maize last year at the Gwebi farm fluctuates from 2s. 11d. to 4s. 3d. per bag, or an average of 3s. 6d. I admit that I should have added, say, 6d. per bag for grinding, which will bring the cost up to 4s. per bag. I find that the charge for oat hay, namely, £2 10s. per ton, is too high, and that £1 per ton is more nearly correct. At the time of writing I had no access to the exact figures, and as so little was used, I merely judged the cost, putting it high to be on the safe side. I find that I should have charged 5s. per 100 lbs. instead of 4s. 6d. per 100 lbs. for ground nuts.

The revised costs are therefore as follows:—

Crushed maize valued on the farm at ...	£0	4	0	per bag.
Veld hay valued on the farm at	0	7	6	per ton.
Oat hay valued on the farm at	1	0	0	,,
Napier's fodder valued on the farm at	0	5	0	,,
Teff hay valued on the farm at	0	12	6	,,
Velvet bean hay valued on the farm at	0	12	6	,,
Green maize stalks valued on the farm at	0	10	0	,,
Majorda melons valued on the farm at	0	5	0	,,
Ground nuts (unshelled) valued on the farm at	0	5	0	per 100 lbs.

The total cost of feeding for 144 days on this basis is:—

Group 1.—£17 10s. 4d., instead of £16 7s. 10d. as stated.

Group 2.—£11 13s. 2d., instead of £10 16s. 2d. as stated.

No interest on the capital outlay of £60 per group is considered, because it is thought that at present farmers are more likely to feed their own bullocks which they have bred or have acquired for trek purposes rather than to purchase animals specially for feeding. In such cases the market for store cattle is so uncertain and restricted that it is doubtful if there would be any means of earning interest on the value of the bullocks.

Herding is not charged, because in practice some would run bullocks in fenced enclosures and others would run them merely as part of a large mob, so that the amount to charge against this item is questionable.

Grazing is not charged, because it cannot be said that the open veld, of which there is still a superabundance, has any regular rentable value for grazing. In most cases the farmer will make nothing out of his spare veld if he does not use it for grazing his own animals. Such an argument does not, I am aware, hold good in book-keeping, but at the moment I submit that it does in practice.

With regard to interest on the outlay invested in buildings, I think Mr. Rawson will agree that in most instances in this country this is a negligible quantity. I know of some instances in which six or eight bullocks have been successfully

fed, and a large quantity of good manure has been produced, exactly on the lines indicated by my experiment, in an enclosure the capital value of which could not possibly exceed 20s., including the labour of erecting it.

In the original reckoning, the value of manure has been placed against labour, but to be consistent, if it is desired to render precise accounts, one must particularise in regard to these items also. I calculate, in the case of Lot 2 (running by day and yarded at night), that the herding of eight bullocks for 144 days on a basis of 1s. per day for 50 animals costs 23s.

The labour of feeding, bedding up, etc., may be reckoned on a basis of two boys for 50 bullocks, exclusive of white supervision. This charge, therefore, for eight animals for 144 days is £2 6s. I have charged the same for both groups, as the difference in respect of the group that received no midday meal is very slight.

On the basis of the foregoing, I submit herewith a comparative statement shewing that, in the case of Group 1, the revised data give an excess of receipts over expenditure of £11 18s. 2d., instead of the original £12 14s. 2d.; and in the case of Group 2, £6 16s. 4d., instead of £8 9s. 10d.

While I value Mr. Rawson's criticism, and shall always be glad to discuss matters relating to feeding with farmers, I cannot help thinking that he has scarcely taken the right view of experiments such as the one under discussion. By means of these experiments (the one in question being only part of a series) we hope to arrive at definite information in regard to (a) the best kinds of food on which to fatten a beast, (b) the amounts of such foods which can be satisfactorily used, (c) the time which it takes to fatten a beast of a given type, (d) the weight of beef which can be produced for a given amount of feed, and (e) the best methods of administering the feed.

Should a definite solution of these questions be happily arrived at, there will still remain the necessity for the farmer to take into consideration and compare (a) the market for crops, (b) the price of store cattle, and (c) the price of beef, before he can form any estimate whatever as to the profit or otherwise to be derived from feeding cattle.

Mr. Rawson states definitely that my article referred to is misleading. As indicated at the commencement of this article, in order that it should not be so, the data on which my calculations were based were given in full. Mr. Rawson has proved the fallacy of his statement by taking up these data and fitting them, as it were, to his own circumstances exactly as I believe 99 per cent. of the farmers in the maize belts or elsewhere are capable of doing. It is, I think, fully realised by farmers throughout the country that the Gwebi Experiment Farm is situated on typical red soil, and that therefore the results obtained there, to a great extent, do not apply to granite veld conditions.

Mr. Rawson concludes by stating that much more profit could have been made by selling the crops direct than by feeding them to bullocks. I would point out that no statement to the contrary is either implied or expressed in my article. Had there existed a regular market for large quantities of the various feeds used, I should have furnished a statement shewing the comparative advantages of selling direct, and feeding to bullocks. I submit that at present, with the exception of maize and ground nuts, there is no regular market for an appreciable amount of any of the feeds used. It is not contended for a moment that the feeding of 12 lbs. of maize per bullock per day, when maize is worth 13s. or 14s. per bag, is advisable. This, however, is an exceptional and not a standard price. I am well aware also that financial stringency often compels the farmer to dispose of his maize and ground nuts for cash, apart from the question of which is the most profitable way of disposing of them.

I would remind Mr. Rawson that but for the arrangement come to with the Imperial Government, there was every prospect of a slump in maize, and that even at 10s. 6d. per bag as a sure price for grades 1 and 2, it is a matter for consideration whether or not it will pay to feed our below-grade grain to cattle this coming season. This any farmer can calculate out for himself with the data furnished in these experiments.

Further experiments are about to be carried out with a view to ascertaining the smallest amount of the more valuable and saleable feeds which it is necessary to use in feeding bullocks, and it is hoped that a way will be shewn of utilising

profitably many cheap crops which at present can be grown, but which are not readily saleable. It will be generally agreed that experiments of this kind must be carried on now, at whatever price maize is, against the time when the average market price is lower.

Last but by no means least, it is hoped to shew a way of making cheap and good manure, in order that the land may have returned to it some of that which is taken out, and be prevented from deteriorating to a point at which it will not grow maize profitably.

COMPARATIVE STATEMENT.

LOT 1.

	Original Calculation.				Revised Calculation.			
	Debit.		Credit.		Debit.		Credit.	
	£ s. d.		£ s. d.		£ s. d.		£ s. d.	
Cost of group at Government Experiment Station, including £2 expenses ...	60 0 0		...		60 0 0		...	
Cost of feeding group for 144 days ...	16 7 10		...		17 10 4		...	
Cost of labour of feeding, bedding up, etc.	...		...		2 6 0		...	
Interest on £60 for 5 months at 6% per annum	...		...		1 7 6		...	
Railage and expenses of marketing ...	2 0 0		...		2 0 0		...	
Sale price of group	...		91 2 0		...		91 2 0	
Value of manure—2 tons per beast at 5/- per ton	...		...		...		4 0 0	
	78 7 10		91 2 0		83 3 10		95 2 0	
To balance—being profit on the transaction	12 14 2		...		11 18 2		...	
	91 2 0		91 2 0		95 2 0		95 2 0	

LOT 2.

Original cost of group at Government Experiment Farm, including £2 expenses	60 0 0		...		60 0 0		...	
Cost of feeding group for 144 days ...	10 16 2		...		11 13 2		...	
Cost of labour of feeding	...		...		2 6 0		...	
Cost of herding	...		...		1 3 0		...	
Interest on £60 for 5 months at 6% per annum	...		...		1 7 6		...	
Railage and expenses of marketing ...	2 0 0		...		2 0 0		...	
Sale price of group	...		81 6 0		...		81 6 0	
Value of manure—1½ tons per beast at 5/- per ton, and improvement to grazing ...	...		...		...		4 0 0	
	72 16 2		81 6 0		78 9 8		85 6 0	
To balance—being profit on the transaction	8 9 10		...		6 16 4		...	
	81 6 0		81 6 0		85 6 0		85 6 0	

The Agricultural Outlook.

The outlook as we write (last week in January) is a very hopeful one, and there is reason to anticipate a highly satisfactory season from the agriculturist's point of view. In December fear was entertained that the continuous rain might have a seriously detrimental effect upon both crops and young stock. Fortunately the weather cleared up before extensive and radical damage had been done. Stock are reported to be in excellent condition, with very little disease. Grass is plentiful, and, if a fair amount of rain falls in February and veld fires can be kept within limits, the pasturage should be sufficient to carry stock well over the first half of winter.

In some low-lying districts crops were to a certain extent water-logged for some while after rains ceased, but taking the country as a whole, it may be said that most crops were able to recover from the effects of the severe soaking of December and January. Maize and tobacco have suffered a good deal from cutworms; the mealie grub has been troublesome, and more rust than usual may be seen in the fields, but in spite of all drawbacks, crops may be expected to be well up to the average.

The announcement of the Imperial Government's offer to take over all surplus maize at a fixed price came too late to modify the general planting programme, as it might have done a few weeks earlier, but there is no doubt it has resulted in quite a considerable addition to the maize area. The high prevailing price for wheat, combined with the strenuous efforts of publicists, is also almost sure to be reflected in a greatly increased acreage under winter wheat.

Veterinary Report.

November, 1916.

AFRICAN COAST FEVER.

SALISBURY, MAZOE AND MREWA DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the existing centres of infection.

MELSETTER DISTRICT.—No fresh outbreaks. On the infected farm Jameson one beast died; the *post-mortem* lesions were suggestive of Coast Fever, but microscopic examination proved negative.

GWELO DISTRICT.—No fresh outbreaks. Three head were destroyed on the infected farm Cross Roads.

SUSPECTED GALLSICKNESS.

Early in the month several deaths were reported amongst the cattle on the farm Dunholm, Makoni district. A *post-mortem* examination shewed evidence of gallsickness. Several calves were found to be ill, shewing rise in temperature and dulness. These were treated with trypan-blue, and all except one recovered. This result points to redwater infection. Towards the end of the month some further deaths occurred, bringing the mortality up to 12 head. Microscopic examination proved negative. Further observations are being conducted.

MEASLES IN PIGS.

The carcases of 458 pigs were inspected at the Salisbury Bacon Factory, 40 of which were condemned as affected with measles.

MALLEIN TEST.

The following animals were tested with mallein on importation, with negative results:—Horses, 9; donkeys, 23.

IMPORTATIONS.

In addition to the above, the following animals were imported:—Bulls, 4; heifers, 76; sheep and goats, 150.

EXPORTATIONS.

Slaughter cattle to Johannesburg *via* Bulawayo, 1,013; *via* Liebig's Drift, 482; total to date, 11,395.

December, 1916.

AFRICAN COAST FEVER.

Salisbury, Mazoe, Mrewa and Melsetter Districts.—No fresh outbreaks, and no cases of disease at any of the infected centres.

Gwelo District.—No fresh outbreaks. Two animals destroyed on the infected farm Cross Roads.

BLACK QUARTER.

Outbreaks of this disease occurred on the farms Glamorgan and Lion's Den and Radilladi's Reserve, Bulalima-Mangwe district. At Glamorgan 24 head, and at Lion's Den 9 head, of young stock, ranging from 9 months to 2 years old, died. In some cases snake bite was supposed to be the cause, but there is no doubt that it was black quarter. At the Reserve the infection appeared amongst sheep.

Hitherto we have been remarkably free from black quarter. Up to the present outbreaks its existence has only been recorded twice since the Occupation. The very heavy rainfall which has occurred in the district, after several years' shortage, has probably been the determining influence in the present manifestation of infection.

TUBERCULOSIS.

An aged cow in a herd on the Umtali commonage was suspected of being affected with this disease. The animal was destroyed, and *post-mortem* examination shewed advanced lesions of tuberculosis; microscopic examination confirmed. In this herd two suspicious cases occurred in the years 1911 and 1913 respectively. The tuberculin test is being applied to the whole herd.

SUSPECTED GALLSICKNESS.

On the farm Dunholm, Makoni district, the mortality amongst the cattle continued during the month; four deaths occurred, bringing the total up to 16 head. Smears forwarded from two animals shewing symptoms of illness shewed acute anaplasmosis on microscopic examination. It is somewhat remarkable and perplexing that these two, the only cases in which the microscope gave a positive diagnosis, should have recovered.

On another farm in Makoni district six head died during the month. Investigation shewed that the cause was undoubtedly poison of a vegetable nature.

A considerable number of cases of gallsickness (anaplasmosis) were reported from various districts.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 20.

TUBERCULIN TEST.

Four heifers imported from England were tested, with negative results.

IMPORTATIONS.

Horses, 20; bulls, 32; heifers, 338; sheep and goats, 2,053.

EXPORTATIONS.

Slaughter cattle to Transvaal *via* Bulawayo, 977; *via* Liebig's Drift, 347.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Width of Tyres Ordinance, 1916.

The attention of owners of wagons and other vehicles, not including conveyances intended solely to carry passengers, is drawn to the Width of Tyres Ordinance, 1916, which regulates the width of the tyre in use on any vehicle made in or imported into Southern Rhodesia on or after the 1st day of April next.

Attention is also drawn to the regulations published in *Gazette* of 26th January, providing for the registration of vehicles in use or in stock in Southern Rhodesia prior to 1st April, 1917.

All owners of vehicles should, under these regulations, apply at once to the Civil Commissioner of their district for a registration certificate in respect of each vehicle or vehicles as defined in the Ordinance which they now possess and which they desire to use on any public road not in any municipality or other area within the control or management of a municipal council on or after 1st April, 1917.

The application should contain a full description of the vehicle or vehicles to be registered, including, if possible, the name of the maker, and should be accompanied by a fee of 2s. 6d. for each such vehicle.

Copies of the Ordinance may be seen at the office of any Civil Commissioner or Magistrate or other Government official at which *Government Gazettes* are filed.

Merino Sheep on the Government Experiment Farm, Gwebi.

Reports from Port Elizabeth wool salesmen on the season's clip from this flock are to the effect that it represents intrinsically a good type of wool, and is of fair length, good quality, free from anything of a coarse or kempy nature, extremely earthy in condition owing to the nature of the soil and of a type very suitable for combing purposes, and saleable in all the chief Home centres. The price for the Gwebi wool at the coast was one shilling and three farthings per pound, and for wool from sheep from the Longila Experiment Farm tenpence, the difference being chiefly due to the presence of grass seed in the latter.

The clip was packed in 38 grain bags, 1,209 lbs. in all, but our agents state that "if there had been a larger quantity of this wool packed in bales ready for export we would have been able to obtain a higher price." The number of sheep shorn to produce this quantity was 203, so the average weight of fleece is about 6 lbs. Apart from the question of mutton, therefore, this experiment indicates the possibility, under ordinary mixed farming conditions, of securing by the use of woolled sheep an additional source of profit over the native Africander or Persian breeds.

Farming Calendar.

February.

BEE-KEEPING.

In some districts a second flow of honey may be looked for from the veld flowers and late growing crops. Honey being secured in either sections or shallow frames should not be permitted to remain too long on the hive at this time of year, as it will become soiled with the bees' feet. Robbers may be anticipated, and this is a sign that the honey flow is nearly over. Where stocks are short of food, feed rapidly inside the hive; excellent feeders can be supplied by appliance dealers. Queenless stocks can now be re-queened, or two stocks can readily be united by previously dusting each lot with household flour. Grade and dispose of honey. It may be advantageous to reserve the choicest specimens for exhibition and competition at our forthcoming agricultural shows.

CITRUS FRUITS.

The notes on planting still apply, if trees are still planted this month, an operation which, however, it is not desirable to leave so late. Trees planted after about the end of January may only get established when it is too late that season for them to commence growth, the consequence being that what growth there is is still sappy at the approach of the cold weather and so stands a chance of being nipped. In such case the tree would have been better left in the nursery row to be lifted and transplanted into the orchard the following spring.

By the end of February or early March the cover crop should be ready to plough into the orchard, with the possibility of sufficient rains after it is done to assist in rotting the plants in the soil. A continuous watch should be kept for insect pests, and fumigation or spraying undertaken immediately any pest is observed. If no cover crop has been sown, the orchard should be kept in a good state of cultivation, and not allowed to be overrun with grass and weeds. Destroy all fruit infested with Natal codling moth by burning or burying deeply. Some success has been obtained by smearing the first oranges that begin to turn colour with tanglefoot, as these are the first fruits to be attacked by the pest. Do not allow the fruit to fall to the ground before destroying it, but pick all affected fruit as soon as it is observed.

CROPS.

During this month the farmer's energies will be concentrated on keeping the lands thoroughly clean, and if this is done effectively now, no further serious damage from weeds need be feared. Most summer crops will be in the ground. Maize for ensilage may still be sown, also catch crops of buckwheat and teff for hay and seed. The main maize crop should be cleared of suckers, which can be fed to stock. The most vigorous plants should be marked for seed selection by cutting the stalk above the cob, and the date of tasselling should be noted both in the main crop and the ensilage crop. In case of excessive moisture, the use of the wing shovel plough is strongly recommended. Monkey nuts should not be cultivated after the period of flowering, which is usually early in February. Hay-making should start in February if weather conditions allow. The sooner the veld is cut for hay the better the product obtained. Land for winter crops of oats and wheat should now be got ready as weather conditions permit. Napier's fodder

slips planted early in the season can now be divided. Potatoes are sometimes planted this month in order to obtain seed for the early plantings the following season.

DECIDUOUS FRUITS.

This is the time to carry out summer pruning, after harvesting the crop, and when the flow of sap begins to become sluggish.

ENTOMOLOGICAL.

Maize.—The first brood of the stalk borer matures this month, and the young of the second brood may be found amongst the younger leaves. Weeds should be kept down (see March). Certain caterpillars are sometimes troublesome. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912, and "Some Injurious Caterpillars," *Agricultural Journal*, February, 1915.

Tobacco.—Stem borer, leaf miner and budworms are the chief pests likely to be troublesome. See "Handbook of Tobacco Culture," published by the Department of Agriculture, pp. 71-99.

Potato.—Ladybirds and tuber moth may call for attention; the latter, when very bad, sometimes causes considerable wilting of the crop besides attacking the tubers. See *Agricultural Journal*, October, 1913, and February, 1910.

Cabbage Family.—All members of the family are liable to the attack of sawfly and webworm during February. See *Agricultural Journal*, February, 1914; April, 1910; and April, 1911.

Beans and Cowpeas.—These suffer chiefly from stem maggot and blister beetles, which destroy the blossoms. The latter must be collected by hand. The former is dealt with in the number of this *Journal* for April, 1913.

Melon Family.—The most important pest is the melon fly, which "stings" the fruit of all species of gourds. At present no remedy is known except collecting and destroying the infested fruit early in the season. Aphis on the leaves and shoots may be destroyed by careful spraying with tobacco and soap wash or paraffin emulsion.

Mangolds and Beets.—These are frequently defoliated by caterpillars. Spray with an arsenical wash.

Citrus Trees.—The chief pest requiring attention during February is citrus codling. The infested fruit should be gathered and destroyed regularly. The fruit is also apt to be attacked by large fruit-piercing moths, for which unfortunately no remedy is known.

Deciduous Trees.—Apple, pear and late peaches suffer chiefly from fruit moths which puncture the fruit. No remedy is known except netting the trees.

Fig.—The fruit is liable to the attack of fig weevil. Infested fruit and all wild figs near the trees should be collected and destroyed. The borer in the stem may be killed by inserting a little carbon disulphide into the burrow and sealing it up.

Castor Oil.—Two-year-old plants which contain borer should be cut down and burnt. See *Agricultural Journal*, October, 1912.

FLOWER GARDEN.

During this month the flower garden is gradually approaching perfection, and nearly all plants are in bloom. If these are constantly plucked the yield will be increased, and except where required for seed, all flowers should be removed as they fade, for seeding shortens the life of many plants. All runners and creepers should have constant attention, and be tied up and trained. Dahlias in more exposed positions should be carefully tied to their stakes, as they now become top heavy with the weight of their blooms. Palms in the house and conservatory will benefit much if occasionally put out in the rain.

FORESTRY.

Complete planting out of ever-greens. Sow in nursery seeds of slow growing species such as cypress, pines, etc. All planting should be completed this month, in the early part if possible.

GENERAL.

This is a busy time for the farmer. Weeds will be very much in evidence and difficulty will be experienced in keeping them under. Stock will have fully recovered their condition, but ticks will be troublesome. The dipping tanks must be fully utilised now.

POULTRY.

Do not attempt to make your birds lay during the moult, and, if possible, keep them dry. As the feathers are being cast, food of a cooling rather than a stimulating nature should be given. Do not have any superfluous fat on your moulting birds, or they will probably stick in the moult. Give all birds a plentiful supply of green food. Keep your late hatched birds growing as long as possible. The early hatched pullets should be giving a good supply of eggs now. Do not forget the dust bath.

STOCK.

Cattle.—Grass will now be at its best, and no anxiety need be felt about feed. In the case of milking cows which have been fed during the earlier rainy months, a little crushed and soaked mealies, or something similar, may still be given at milking, if only to bring the cows quietly to their places. The importance of a clean, light, airy and well-drained shelter for calves cannot be over-estimated. Calves up to three or four months old do not require a great deal of exercise, and on wet days are better left in a dry shed with a little sweet hay. A few hours' exercise on bright days in short grass is all they need. Vigilance in keeping down ticks must not be relaxed. These remarks apply specially to milking herds and to cattle that are kraaled. Cattle running at large need little attention beyond dipping, and if the calves are not desired from November to March, the bulls must now be taken out of the herd.

Sheep.—Vleis and low-lying ground must be avoided. Sheds should be airy, dry and clean. If grass seeds are troublesome to woolled sheep, an area should be mown for them, or when rain begins to slacken, they may be shorn. If wire worm is troublesome, dose and move to fresh grazing and kraals.

TOBACCO.

The curing should be well on now, if any tobacco was transplanted in November. This will be a busy season until the curing is finished; however, one or two good plough boys with all the spare oxen should be breaking land for the next season's crop, turning under all vegetable matter.

VEGETABLE GARDEN.

Potatoes should receive attention and be carefully ridged up, and care taken that the stalks are not buried. Seeds for winter crops should be sown, such as beet, Brussels sprouts, cabbage, carrots, beans, peas, onions, turnips, tomatoes, etc. Vegetables planted out during this month might be placed a little closer together than usual, as watering may have to be resorted to before they mature.

VETERINARY.

This is a bad month for horsesickness. Redwater and gallsickness in cattle occur all the year round, but the summer months, when ticks are

active, is the worst time. Three-day sickness in cattle may now be looked for. Trypanosomiasis is a summer disease. Blue tongue is somewhat similar to horsesickness, and February is a bad month. The disease has so far only been found in imported merinos, but it spreads from these to indigenous sheep. After twelve months in the Territory, sheep do not contract the disease. The first symptom is laminitis, the second a protruding blue tongue. White scour may be prevalent now, but dipping is eradicating the disease.

WEATHER.

This is generally the wettest month of the year, with marked differences of from 10 inches to 15 inches on the eastern mountain ranges, 7½ inches over Mashonaland, 4 inches to 6 inches in Matabeleland, and least, but still some, rains in the Limpopo Valley. The rains may be expected to decrease in intensity after the middle of the month if the season is normal.

March.

BEE-KEEPING.

Be on the look-out for damage to stocks by the wax moth; strong stocks generally tend to obviate this pest. Where the heavy rains have penetrated the weak hive roofs and caused dampness among the quilts, these should be taken off and thoroughly dried in the sun, then replace. Contract the entrances of hives to prevent robbing. Unsold honey should be stored in a warm dry cupboard. Keep apiary clear of weeds.

CITRUS FRUITS.

Two thorough sprayings about this season, when the rains are usually practically over, at an interval of about two weeks, will often obviate the necessity for further work against scale insects until the beginning of the next wet season. If not already done, orchards should be ploughed and cross-ploughed and worked up into a really good surface, so that the cultivators can be kept going, say, every two weeks until it is necessary to irrigate, after which cultivation should be continued. If March prove a dry month, orange trees holding up a crop of fruit will probably require irrigation, but under normal weather conditions it should not be necessary. The same remarks apply as last month with regard to fruit moths. About the end of this month fall budding can be taken in hand, that is the insertion of buds that are intended to remain dormant until spring.

CROPS.

For general cultural treatment, see February notes. Rape and kale for autumn feeding may be sown during the latter half of this month. Haymaking can continue. Land for winter crops of oats and wheat should now be ready. The division of Napier's fodder slips can be continued up to the end of this month. Buckwheat, linseed, teff grass and manna will be ready for reaping this month. The silo pit should now be got ready. Maize will be ready for ensilage in four to five weeks after the period of tasselling.

ENTOMOLOGICAL.

Maize.—The stalk borers of the second brood will be found freely in the stalks, but nothing can be done at this stage. Caterpillars may attack the crop during this month, usually *as a sequence to cultivation after the weeds have been allowed to get too far ahead.* The caterpillars attack the crops on account of their food being suddenly destroyed. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912; and "Some Injurious Caterpillars," *Agricultural Journal*, February, 1915.

Tobacco.—The crop will by this time mostly have outgrown insect injury, but any plants still infested with stem borer should be removed and burned. Leaf miner will still be in evidence, and budworms may put in an appearance. See "Handbook of Tobacco Culture," published by the Agricultural Department, pp. 71-90.

Potato.—Ladybirds may still be injurious. See *Agricultural Journal*, October, 1913. Careful hilling should be attended to on account of the tuber moth. See *Agricultural Journal*, February, 1910.

Cabbage Family.—Sawfly. See *Agricultural Journal*, April, 1910; and April, 1911. The fly will probably be less injurious by this time. Cabbage louse may be on the increase. Very thorough spraying with tobacco wash and soap is of value when the plants are young.

Beans and Cowpeas.—The most obvious enemies are the blister beetles, which destroy the blossoms. These can only be destroyed by hand. Stem maggot continues injurious, causing dropping of leaves on the larger plants, but little can be done at this stage.

Melon Family.—Plants of this family are subject to the attack of melon fly and aphis. Careful spraying with tobacco wash or paraffin emulsion is of value against the latter.

Sweet Potato.—Hawk moth caterpillars occasionally appear in countless thousands and defoliate the crop. Immediate spraying with an arsenical wash is called for when the insects first appear. See *Agricultural Journal*, June, 1912.

Citrus Trees.—Attention should constantly be given to the systematic collection and destruction of infested fruit to keep down the citrus codling. Large fruit-piercing moths may attack the fruit during the month (see under February).

Deciduous Trees.—But little damage from insects is likely to occur to these fruits during March.

Fig.—Fig weevil still calls for attention in collecting and destroying the infested fruit.

Castor Oil.—See under February.

FLOWER GARDEN.

During this month the garden should be seen at its perfection, and, owing to our rains, requires a great deal of attention in order to keep the soil free from weeds and caking. Drainage should also be looked to, in order to avoid plants being swamped or washed away. Dahlias and carnations should now be in their heaviest bloom, and will require tying up, and the dying blooms should be removed, in order to prolong their flowering period. Plants for winter flowering should now be coming on and planted out. Cuttings of carnations may now be made, and should be picked from the choicest plants, and taken from stems which have borne the finest blooms. The cuttings should be placed in boxes containing sand, and kept in a moist condition in a warm position sheltered from the winds. These should be ready for planting out in about two months, and bloom in three. Carnations, verbena, antirrhinum, penstemon, pansy, dianthus, phlox, calliopsis and escholtzia may be sown for early blooming next spring.

FORESTRY.

If necessary, cultivate between the rows of trees planted out in the previous months. Plough any fire lines that are necessary and break up any new ground that will be required for next season's planting. Remember that the roots of trees penetrate deeply into the ground, and therefore plough as deeply as possible. Where black wattle thrives, sow seed this month, after well soaking.

GENERAL.

At this time the condition of stock on the veld is good—perhaps at their best. It is well, however, to look ahead and make ready for the coming winter by the provision of winter feed in such forms as veld hay, silage, baled fodder from maize, manna, oats, teff, velvet beans, and the like, and by taking steps to ensure that water will be available for the stock in winter as near their grazing ground as may be.

POULTRY.

An iron tonic will be found beneficial to any birds that are not moulting satisfactorily. If the new feathers are forming, give a little increase in food containing some animal matter. Flowers of sulphur in the soft food will help to keep the birds in condition. Continue to give abundance of green food. Keep an eye on the birds which have made the best progress in the moult with a view to early mating.

STOCK.

Cattle.—The precautions recommended for February apply equally to March. Weather permitting, no opportunity should be lost of getting in good, sweet hay before grass is too old. Arrangements should be completed for storing as much silage as it is proposed to make, so that the crops reserved for this purpose may be harvested immediately they are ready.

Sheep.—The same precautions as for February should be taken, but as less rain may be expected, conditions will probably be more favourable. If late winter lambs are not desired, the rams should be removed from the flock.

TOBACCO.

The tobacco set out about Christmas time should be coming to maturity now, and the crop, if early and a good one, should be all reaped by the end of April.

VEGETABLE GARDEN.

Tomatoes, peas and beans should be in full bearing, and should be staked and tied. Weeding and cultivation should be extensively carried out. Seeds for late winter crops—beans, cabbage, cauliflower, peas, radish, turnips, spinach and beet—should be sown.

VETERINARY.

Horsesickness is now prevalent. Redwater and gallsickness occur in cattle all the year round, but the worst time is the summer, when ticks are numerous. Trypanosomiasis is a summer disease. Blue tongue may now be expected.

WEATHER.

Rains may be looked for in considerable quantity, though less than in previous months, 5 inches in Mashonaland and 3 inches in Matabeleland being normal, with as usual more on the eastern frontier. No useful rain need be reckoned upon after the end of this month, except on the eastern border, but the rainy season tapers off in an irregular and often erratic manner and without certainty.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1916	November	7·29	0·51	0·07	0·24
1916	December	6·69	0·32	0·05	0·21

TEMPERATURES.

Station	November		December	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
Mashonaland—				
Charter—				
Enkeldoorn	82·8	54·9	81·8	57·6
Hartley—				
Gatooma	88·3	64·7	84·4	65·1
Hallingbury Farm	83·92	61·56	81·61	62·35
Hartley Hospital	86·12	61·44	81·81	62·62
Idaho Farm	—	—	—	—
Lomagundi—				
Eldorado Mine	82·18	62·1	—	—
Kanyemba	—	—	—	—
Sinoia	86·1	74·4	84·2	75·1
Sipolilo	85·1	62·56	77·9	62·5
Makoni—				
York Farm	—	—	—	—
Mangwendi—				
Kwenda Hospital	76·1	62·9	76·2	64·0
Mazoe—				
Shamva Mine	84·1	64·86	81·54	65·25
Melsetter—				
Melsetter	74·4	53·9	74·6	59·5
Mount Selinda	75·38	59·0	77·3	62·2
Vermont	75·9	59·9	80·3	62·6
Salisbury—				
Chishawasha	80·28	58·6	77·3	61·1
Salisbury (Gaol)	82·0	58·1	—	—
Umtali—				
Chiconga's Location ...	80·99	61·97	82·4	65·91
Public School	81·3	60·79	—	—
Summerfield	69·1	60·99	—	—
Victoria—				
Eythorne	88·97	58·13	88·0	60·0
Morgenster	—	—	—	—
Victoria	81·23	60·71	79·99	63·08

TEMPERATURES—*(Continued).*

Station	November		December	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	87·4	61·1	84·6	62·7
Garth	86·31	64·31	84·1	62·77
Plumtree School	85·3	60·7	73·28	63·41
The Retreat	90·9	—	87·1	—
Bulawayo—				
Observatory	82·6	60·1	—	—
Gwanda—				
Antelope Mine	88·49	64·48	84·87	65·29
Mazunga	89·9	64·3	88·3	67·1
Tuli	92·54	67·2	89·86	69·0
Gwelo—				
Gwelo (Gaol)	83·12	49·68	79·1	51·54
Hagley (Iron Mine Hill) ...	83·2	57·1	—	—
Matobo—				
Holly's Hope	87·85	63·33	84·71	64·1
Rhodes Matopo Park ...	88·06	60·01	82·6	60·8
Umzingwane—				
Essexvale	85·90	62·47	80·1	64·2
Hope Fountain	81·89	58·85	78·6	60·5
Wankie—				
Victoria Falls	89·1	53·5	85·93	52·64
Wankie (Hospital)	93·9	70·4	—	—

RAINFALL.

Station	November	December
MASHONALAND—		
Charter—		
Buhera	5·15	10·42
Bushy Park	5·39	10·39
Enkeldoorn	4·05	6·56
Marshbrook	3·60	13·49
Range	5·18	9·53
Riversdale	0·42	12·16
Umniati	3·31	12·12
Vrede	3·03	12·58
Chibi—		
Chibi	2·65	4·03
Nuanetsi Ranche	3·66	2·39
Wylde Grove	5·59	8·89
Chilimanzi—		
Central Estates	3·14	11·20
Chilimanzi	4·03	7·44
Driefontein	2·50	8·81
Induna Farm	3·09	11·34

RAINFALL—*(Continued).*

STATION	November	December
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	2·03	4·70
Umvuma (Railway)	5·67	12·86
Darwin—		
Mount Darwin	2·50	14·20
Gutu—		
Chingombe	5·03	8·41
Eagle's Nest Ranche	3·95	11·16
Gokomere	3·72	8·73
Gutu	4·49	8·12
Hartley—		
Ardgowan	4·09	12·90
Auchter Leny	4·31	12·01
Battlefields (Railway)	3·32	10·30
Carnock Farm	5·43	8·89
Clifton Farm	—	—
Elephant Hill, Battlefields	—	—
Elvington	2·91	12·11
Gadzema (Railway)	1·99	8·89
Garthnor	4·83	8·90
Gatooma	2·75	11·28
Gatooma (Railway)	2·46	10·57
Gowerlands	4·72	8·79
Hallingbury Farm	2·91	9·47
Hartley Hospital	2·57	9·95
Hartley (Railway)	3·11	9·30
Hopewell	3·03	9·06
Idaho Farm	—	—
"Jenkinstown"	6·72	7·38
Makwiro (Railway)	4·18	7·09
Philiphaugh	3·19	6·58
Shagari	1·88	7·52
Spitzkop	—	—
"Stoneygate"	2·30	15·10
Inyanga—		
Inyanga	6·93	8·20
St. Trias' Hill	5·65	7·10
Lomagundi—		
Argyle	3·37	12·12
Banket Junction (Railway)	7·52	13·06
Darwendale	4·47	6·30
Duxbury Farm	4·05	14·59
Eldorado (Railway)	4·87	13·29
Eldorado Mine	5·64	—
Golden Kopje Mine	4·72	10·41
Lion's Den	4·95	14·16
Lone Cow Estate	6·43	8·00
Longmead	4·20	12·66
Maningwa	3·24	13·56
Palm Tree Farm	3·32	14·21
Sinoia (Railway)	4·52	9·53
Sinoia	4·09	10·94
Sipolilo	7·58	10 12
Umvukwe Ranche	6·22	10·71

RAINFALL—(*Continued*).

Station	November	December
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	5·88	9·36
Chimbi Source	6·60	8·03
Delta	1·93	7·33
Eagle's Nest	5·44	4·33
Ellavale	—	—
Gorubi Springs	6·62	12·26
Headlands (Railway)	5·09	5·27
Mona	3·63	9·29
Monte Cassino Mission	9·07	9·94
Odzi (Railway)	7·04	6·73
Rusape (Railway)	4·50	8·75
Springs	7·00	13·58
York Farm	—	—
Mangwendi—		
Bonongwe...	7·65	11·94
Huish Estate	5·60	10·25
Kwenda Mission	2·94	7·96
Land Settlement Farm	9·29	6·33
Macheke (Railway)	6·15	8·13
Marandellas	7·61	—
Marandellas (Railway)	7·72	9·60
Nelson	5·03	7·37
Selous Nek	8·86	7·01
Theydon	6·28	8·64
Tweedjan	7·78	14·70
Verdoy	3·64	—
Mazoe—		
Avonduur	3·72	7·90
Bindura	—	—
Bindura (Railway)	4·21	6·88
Ceres	7·16	7·02
Chipoli	6·54	10·99
Citrus Estate	3·59	6·57
Dunmaglas	3·26	—
Jumbo (Railway)	5·99	8·67
Kilmuir	4·35	9·90
Kingston	6·03	6·96
Laguaha	2·48	16·80
Lowdale	—	—
Mazoe	3·94	7·16
Mguta Valley	—	—
Omeath	5·22	8·16
Protea Farm	4·20	—
Ruia	8·31	11·20
Ruoko Ranche	5·26	9·65
Shamva	4·57	11·44
,, Mine	4·43	7·56
Stanley Kop	5·58	7·52
Sunnyside	3·43	8·78
Teign	2·94	6·96
Virginia	4·01	7·85
Volynia Ranche	5·12	8·29

RAINFALL *(Continued)*.

Station	November	December
MASHONALAND—(Continued)		
Mrewa—		
Glen Somerset	8·38	6·41
Mrewa	5·52	—
Mtoko—		
Makaha	5·57	13·73
Mtoko	4·27	10·46
Melsetter—		
Brackenburg	9·24	12·42
Chikore	4·00	13·71
Chipinga	7·78	14·44
Helvetia	5·63	12·02
Melsetter	9·98	14·92
Mount Selinda	7·35	17·96
Mutambara Mission	3·28	6·18
Pasture	4·99	4·86
Tom's Hope	4·38	8·93
Vermont	—	—
Ndanga—		
Bikita	8·27	12·55
Chiredzi Ranche	3·13	—
Marah Ranche	2·79	9·11
Ndanga	5·76	11·66
Pamushana	7·22	12·07
Salisbury—		
Ardbennie	—	—
Avondale	8·81	10·91
Botanical Experiment Station	5·67	8·66
Bromley	8·15	7·87
Brookmead	6·14	8·20
Borrowdale (Hatcliffe)	4·07	6·89
Chishawasha	5·03	12·97
Cleveland Reservoir	3·94	5·61
Ewanrigg	4·62	10·12
Forest Nursery	8·03	7·41
Glenara	6·72	8·26
Goromonzi	7·58	6·38
Gwebi	3·49	8·57
Hillside	4·77	8·02
Lilfordia	6·69	5·48
Salisbury (Gaol)	5·95	—
,, (Railway)	5·73	6·75
Sebastopol	5·76	9·36
Selby	4·98	—
Stapleford	8·50	9·55
Sunnyside	4·99	7·39
The Meadows	5·38	8·75
Vamona	5·67	8·49
Westridge	5·37	8·51
Umtali—		
Chiconga's Location	6·37	6·23
Odzani	7·01	7·61
Penhalonga	8 89	10 67
Premier Estate	5·10	7 39
Public School	7·45	—

RAINFALL *(Continued).*

Station	November	December
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	4·91	—
Stralsrund	6·26	8·94
Summerfield	7·38	—
Umtali (Railway)	—	—
Utopia	8·40	4·79
Urungwe—		
Nassau Estate	5·96	9·03
Victoria—		
Brucehame	2·24	6·67
Clipsham	3·81	7·01
Empress Mine	1·95	10·21
Eythorne	1·39	9·07
Fairburn	5·92	8·89
Fort Victoria (Railway)	1·84	5·47
Marthadale	3·72	13·75
Makorsi River Ranche	4·10	6·42
Morgenster	2·56	11·61
Silver Oaks	2·59	11·90
Victoria	1·47	5·60
MATABELELAND :		
Belingwe—		
Tamba	2·55	2·84
Wedza	2·44	3·46
Bubi—		
Bembesi (Railway)	1·18	8·60
Imbesu Kraal	2·18	8·59
Inyati	2·21	8·75
Maxim Hill	1·75	—
Shangani Estates	1·62	9·23
Bulalima-Mangwe—		
Empandeni	3·51	4·55
Garth	2·51	5·17
Mholi (late Magot)	3·03	6·47
Plumtree School	1·03	9·18
The Retreat	2·61	9·04
Riverbank Farm	3·52	7·31
Solusi Mission	2·82	8·25
Syringa	3·07	7·33
Tegwani	—	—
Tjompanie	2·93	5·84
Bulawayo—		
Government House	1·07	6·65
Keendale	1·86	6·11
Khami	2·73	7·86
Lower Rangemoor	1·96	10·15
Observatory	1·62	—
Raylton (Railway)	1·29	7·60
Umgusa	1·20	7·48
Umkien	3·67	5·09
Gwanda—		
Antelope Mine	0·90	3·01
Gwanda (Gaol)	1·14	11·29

RAINFALL *(Continued)*

Station	November	December
MATABELELAND—(Continued)		
Gwanda—continued		
Gwanda (Railway)	1·08	11·02
Lamulas	3·15	5·54
Langalanga	2·25	5·29
Makalali	4·26	3·74
Manantji	2·83	4·35
Mapande	4·14	2·78
Mazunga	4·20	6·29
Mtshabzi Mission	1·22	6·96
Tuli	—	—
West Nicholson (Railway)	2·17	3·36
Gwelo—		
Daisyfield	2·29	—
Dawn	1·91	12·88
Globe and Phœnix Mine	4·23	15·71
Globe and Phœnix (Railway)	3·54	12·32
Gwelo (Gaol)	3·45	11·92
Gwelo (Railway)	4·10	11·82
Hagley	1·59	—
Hunter's Road	3·21	14·69
Indiva Farm	—	—
Lalapanzi (Railway)	4·87	13·71
Lovers' Walk	1·89	12·72
Lower Gwelo	7·20	13·24
Oaklands	3·53	14·78
Que Que	—	—
Rhodesdale Estate	5·48	13·10
Sikombela Farm	4·20	9·45
Troy	—	—
Woodendhove	2·06	14·69
Insiza—		
Albany	3·55	10·50
Anglo-French Block	—	—
Filabusi	1·77	3·61
Fort Rixon	1·95	8·58
Infiningwe	1·15	6·55
Insiza (Railway)	3·58	9·69
Inyezi Farm	0·89	5·68
Orangevale	1·15	12·84
Roodeheuvel	1·59	6·76
Scaleby	—	—
Shangani (Railway)	3·19	7·82
Thornville	2·56	12·00
Matobo—		
Holly's Hope	1·01	4·67
Matopo Mission	2·01	10·34
Rhodes Matopo Park	1·77	7·55
Nyamandhlovu—		
Gwaai (Railway)	3·31	4·69
Edwaleni	3·80	—
Impondemi	3·63	5·71
Melinakanda Junction	1·19	—
Naseby Farm	1·69	6·78
Nyamandhlovu (Railway)	2·88	6·88

RAINFALL *(Continued).*

Station	November	December
MATABELELAND—(Continued)		
Sebungwe—		
Gokwe	2·08	8·61
Inyoka	1·45	8·32
Selukwe—		
Hillingdon	4·86	12·63
Selukwe (Railway)	3·54	16·29
Tokwe River Ranche	2·92	7·86
Umzingwane—		
Balla Balla (Railway)	2·55	10·66
Crombie's	2·43	8·93
Essexvale	1·48	11·84
Heany Junction (Railway)	1·88	9·19
Hope Fountain	1·92	9·72
Springs Farm	1·63	9·40
Wankie—		
Bombusi	1·09	5·89
Malindi (Railway)	0·82	12·16
Victoria Falls	1·19	8·49
Victoria Falls (Railway)	1·70	8·80
Wankie Hospital	2·38	—
Wankie (Railway)	3·12	10·88

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917		
			February	March	April
Beatrice Road	Various farmhouses	H. W. Harris	14	14	11
Bembesi	Queen's Mine Hotel	V. C. Andrews	2	2	6
Bindura	Bindura	A. C. Mills	10	..	14
Bromley	Bromley	A. A. Draper	1	1	5
Charter—Mgezi	Beatrice Mine	W. Krienke	28	28	25
Central	Umvuma	— James	24	31	28
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	9	9	13
Enterprise	Arcturus Hotel	J. G. M. Bernard	7	7	4
Felixburg	Felixburg	R. H. Brown	10	10	14
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	3	..	7
Gatooma	Gatooma	T. J. Golding	17	17	21
Gazaland	Chipinga	W. Wood	24	31	28
Greystone	Roodeheuvel Farm, Shangani	J. W. Spencer	10	10	14
Hartley	Hartley	J. de L. Nimmo	..	..	..
Headlands	Headlands	J. M. Harvard	24	..	28
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	10	10	14
Insiza—Shangani	Shangani	T. E. Penny	..	3	..
Inyazura	Inyazura	A. C. Curling	21	21	18
Iron Mine Hill Proper	Iron Mine Hill	T. Irving	10	10	14
Lalapanzi and Iron Mine Hill	Lalapanzi and Iron Mine Hill	Cyril Allen	10	10	14
Lonagundi	Sinoia	A. H. Layard	17	17	21
Lydiate	Norton	W. Wrench	24	31	28
Macheke	Macheke	J. Cheyne	No fixed dates		
Makwiro	Makwiro	C. D. Voigt	16	16	20
Marandellas and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	3	3	7
Makoni	Rusape	H. Barnes Pope	3	3	7
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	7	7	4
Matopo Branch, R.L. and F.A.	Sibali	———	..	14	..
Mazoe	Glendale Siding	A. G. McCall	14	14	11
Melsetter (North)	Various farms	Rev. R. Wodehouse	..	3	..
Midlands	Gwelo	Harry Payne	9	9	13
Northern Umtali	Farm "Summerfield"	R. O. H. Burton	3	..	..
Norton and District	Norton Siding	———	3	3	7
Que Que	Que Que	E. J. Ross	17	17	21
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	23	30	27
Shamva	Shamva	Wm. Scott	..	14	..
Selukwe	Selukwe	F. S. Clark	No fixed dates		
Somabula and Shangani Flats	Weltevrede School	G. B. Botha	..	10	..
Umvukwe	Various ranches	S. A. S. Colborne	10	10	14
Umtali	Christmas Pass Hotel	J. S. Holland	3	3	7
Victoria	Victoria	John Rennie	2	2	6
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	10	10	14

Departmental Notices.

Information for Farmers

The Department of Agriculture is prepared to furnish to farmers technical advice either by correspondence, or, where possible, by personal visits. All communications should be addressed in the first instance to the Director of Agriculture.

Crops

The Agricultural Branch deals with enquiries relating to agricultural practice, soils, crops, cultural operations, processes, seeds, trees, farm implements and machinery, etc.

Disposal of Pure Seed.

Farmers devoting special attention to the production of pure seed of any locally grown crops are invited to communicate with the Government Agriculturist, and at the same time to submit a ¼ lb. sample of any seed which they may have for disposal.

In addition to indicating the total amount of seed offered and the price f.o.r. the nearest railway station or siding, the correct name of the variety and the origin of the seed from which the crop was grown should be given. In the case of special attention having been devoted to seed selection, the methods employed should be described.

Where these stipulations are complied with, and the samples forwarded are deemed by the Agriculturist of sufficiently high quality for seed purposes, growers and intending purchasers will be put in touch with one another. It is hoped by this means to encourage the production of pure seed, and growers are urged whenever possible to sell their seed under guarantee of trueness to name, type and sample deposited with the Department.

After placing growers and would-be purchasers in touch with one another, the Department can accept no further responsibility except in the position of adjudicator when bulk supplies are thought inferior to sample and description, in which case both parties will be required to abide by the decision of the Department.

For further particulars see article on Pure Seed Supply, *Rhodesia Agricultural Journal*, February, 1914.

Forestry—Sale of Trees

The undermentioned varieties of trees will be available for sale from December onwards.

Price, f.o.r. Salisbury, 1d. each, 8s. 4d. per 100.

The following reductions are made on large orders on condition that the tins are returned. Otherwise they will be charged up at 3d. per tin:—

£3 per 1,000. £2 10s. per 1,000 for orders of over 5,000.
Average height of trees—3 to 9 inches.
Average number in tin—25.
Average weight of tin—25 lbs.

Belhambra.
Callitris calcarata—Cypress pine.
do. robusta—Murray pine.
Casuarina leptoclada—Beefwood.
Cedrela toona—Toona.
Cupressus arizonica.
do. sempervirens, var. pyramidalis—Churchyard cypress.
do. sempervirens, var. horizontalis — Common cypress.
Dalbergia sissoo—Sissoo.
Eucalyptus amygdalina—Peppermint gum.
do. botryoides.
do. calophylla—White flowering gum.
do. citriodora—Lemon-scented gum.
do. corynocalyx—Sugar gum.
do. crebra—Ironbark.
do. leucoxylon.

Eucalyptus melliodora—Grey box gum.
do. microtheca—Coolibah gum
do. paniculata—Ironbark.
do. rostrata—Red gum.
do. saligna.
do. siderophloia.
do. sieberiana.
Jacaranda.
Pinus longifolia—Chir pine.
Tristania conferta.
Thuya orientalis—Arbor vitæ.
Schinus molle—Pepper tree.

The following larger trees are available at 3d. each; average height of trees, 9 inches to 2 feet 6 inches; average weight of tins, 25 lbs.; number in tin, 4:—

Callitris robusta.
Casuarina leptoclado.
Eucalyptus botryoides.
,, paniculata.
,, robusta.
,, rostrata.
,, saligna.
Jacaranda.
Thuya orientalis.
Croton sylvaticus.
Weeping willow.
Grevillea robusta.
Schinus molle.
Lagonaria.

Fourcroya gigantea (Mauritius hemp), 1s. per 100.
Agave sisilana (Sisal hemp), 3s. per 100.
Paspalum, 5s. per 1,000 rooted slips.

Shrubs for Sale

Price, f.o.r. Salisbury, 6d. each. There is no guarantee to have any particular variety of shrub in stock, but everything possible will be done to supply the demand. Most of them are planted four in a tin, but there is usually a fair stock of single tins.

	Approx. height of growth.
Red.	
Holmskioldia	8 ft.
Habrothamnos	5 ft.
Bottle brush	10 ft.
Russellia	3 ft.
Pomegranate	8 ft.
Bauhinia	8 ft.
Euphorbia jacquiniflora	4 ft.
Plumieria (Frangipane)	8 ft.
Bougainvillea	
Poinsettia	
Pink.	
Salvia	3 ft.
Lagerstrœmia flosregina	10 ft.
Sensitive plant	1 ft.
Rhodesian mallow (Dombeya)	10 ft.
Blue.	
Iochroma lanceolatum	10 ft.
Duranta	10 ft.
Plumbago	3 ft.
Heliotrope	3 ft.
Buddleia	6 ft.
Rhodesian tree lobelia	3 ft.
do. lupin	6 ft.
White.	
Spirea (Cape May)	4 ft.
Gardenia	4 ft.
Plumbago	3 ft.
Bauhinia (white and mauve)	8 ft.
Deutzia	5 ft.
Plumieria—Frangipane	8 ft.
Pittosporum undulatum	7 ft.
Lemon-scented verbena	5 ft.
Yellow.	
Tecoma Smithii	10 ft.
Thevetia nerifolia	6 ft.
Cape jasmine	10 ft.
do. laburnum	10 ft.
Holmskioldia	10 ft.
Buddleia	10 ft.

	Approx. height of growth.
Alamanda nerifolia	4 ft.
Streptosolon Jamesonii	3 ft.
Abutilon—"Chinese lantern"	8 ft.
do. —variegated leaf	8 ft.
Poinsettia	8 ft.
Hypericum—St. John's Wurt	4 ft.
Acacia cultriformis	

Mauve.

Iochroma	10 ft.
Salvia	2 ft.

Climbers.

Golden shower—Yellow.
Clitoria ternata—mussel shell creeper—Blue.
Potato creeper (Solanum Wenlandii)—Blue.
Phaseolus caracalla—White.
Jasmine—White.
Podranea—Zimbabwe creeper—Pink.
Dutchman's pipe (Aristolochia sypho).
Ivy.

Hedge plants at 1d. each, 25 in tin.
Bottle brush.
Pittosporum undulatum.
Dodonæa viscosa.

Applications together with remittances and full particulars regarding forwarding should be addressed to the Government Agriculturist and Botanist, Department of Agriculture, Salisbury.

Poisonous Plants

It is of great importance that as soon as possible a study should be made of those plants found in Southern Rhodesia which are poisonous or deleterious to small or large stock. Farmers and others who have known, or suspected poisonous plants on their property, are requested to communicate with the Government Agriculturist and Botanist, Department of Agriculture, Salisbury, at the same time forwarding specimens of the plant, including stem, leaves, flowers, and, where pos-

sible, fruit. Any particular regarding the habits of the plant will be welcomed, and in return the Department will supply all available information regarding the plants.

Live Stock

The Animal Industry Branch is prepared to advise with regard to all matters connected with stock breeding, selection, feeding and registration of stud animals, the dairy industry, poultry management, farm buildings for stock, and kindred subjects. Buyers and sellers of stud stock in Rhodesia are also put in touch with one another.

Entomology

The Government Entomologist advises on matters connected with insect pests of live stock, crops, and fruit trees, and also undertakes the inspection of nurseries and of the importation of plants from abroad.

Chemical Analyses

The Government Agricultural Chemist deals with matters relating to the composition of soils, fertilisers, farm produce of vegetable or animal origin; also the investigation of poisons and of articles of potential economic value.

Nominal charges are made, which, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

A schedule of charges and directions for taking samples will be furnished on application.

With all analyses, reports will be furnished explanatory of the results and, when possible, advice given as to the nature, properties and value of the material.

No charge will be made for analysis where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Citrus Culture

The Government Citrus Adviser advises on all matters connected with the citrus and deciduous fruit industry.

Services of Government Veterinary Surgeons

1. The services of Government Veterinary Surgeons are available to the public, free of charge, for the following purposes only :—

(1) Attending and giving professional advice in connection with the following diseases, viz. :—Anthrax, Contagious abortion, East Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Foot-rot, Heartwater, Glanders, Intestinal parasites amongst sheep and goats, Liver Disease, Lungsickness, Osteo Porosis, Malarial Catarrhal Fever (blue tongue), Rabies, Redwater, Rinderpest, Scabies, Sponziekte (quarter evil), Swine Fever, and any other diseases which may in future be scheduled in terms of section 3, sub-section 18 of the "Animals Diseases Consolidation Ordinance, 1906." Attending to cases of disease amongst live stock which, though not of a contagious or infectious character, may be of general public importance.

(2) Applying tests in regard to Glanders, Tuberculosis, or any other disease against the introduction or spread of which tests are applied under regulations.

(3) Inoculations against the following diseases :—

Horsesickness, Lungsickness, Anthrax, Quarter Evil, Redwater, Malarial Catarrhal Fever (blue tongue). A fee to cover the cost of serum and virus will be charged.

2. The following charges shall be made and payable for services rendered by the Government Veterinary Surgeons in other cases, viz. :—

	£	s.	d.
(1) For every professional visit within three miles of his office or residence	0	5	0

	£	s.	d.
(2) For every professional visit beyond such distance	0	10	6
plus an additional charge of 2/6 per hour whilst engaged in such visits or £2/2/0 a day of 24 hours;			
(3) For advice given at the Veterinary Surgeon's office, for each animal, per visit	0	2	6
(4) The following to be charged in addition to visiting fees :—			
a. For every examination as to soundness, each	1	1	0
b. For castration, horses, each	1	1	0
c. For castration, bulls, each	0	5	0
d. For castration, donkeys, each.. ...	0	10	6
e. For parturition cases, mares, each	2	2	0
f. For parturition cases, cows, each..	1	1	0
g. For other operations, according to nature, from 5/- to £2/2/0.			

3. Double the above fees will be payable for services rendered on Sundays, public holidays, and between the hours of 7 p.m. and 7 a.m.

4. Applicants for the services of Government Veterinary Surgeons must at their own cost provide the necessary transport for the conveyance of these officers from, and back to, their residence or nearest railway station.

5. Farmers and owners of stock throughout the country frequently telegraph for a Government Veterinary Surgeon to be sent to attend an animal which has been taken seriously ill. It is rarely possible to comply with these requests at once, as the Veterinary Surgeon may be engaged on duty which he cannot leave, or is at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the veterinary staff discredited. To obviate this, in all cases where veterinary advice and assistance are required, the owner should telegraph to "Veteran," Salisbury, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This will enable the Chief Veterinary Surgeon to

telegraph advice at once and state whether he is able to arrange for veterinary attendance on the case or not, and save valuable time, which is always of importance in acute cases.

6. The services of Government Veterinary Surgeons will only be available for private work with the consent of such officers, and when such work does not interfere with their official duties, or when the services of a private practitioner are not available.

7. As the arrangement of allowing Government Veterinary Surgeons to attend to private cases is intended purely for the benefit of farmers and stock-owners who may wish to obtain professional advice, no responsibility whatever will be accepted for any loss of stock, etc., which may result from the negligent treatment or advice, or wilful default, of any Government Veterinary Surgeon.

8. All fees collected in terms of these Regulations are payable to the Treasury through the local Receiver of Revenue.

Irrigation

From the Agricultural Engineer assistance may be obtained by farmers for the following :—

1. In the locating of possible irrigation projects.
2. In the preparation of surveys or plans and for irrigation works, including weirs, dams, furrows, pumping plants, and determining the extent of land which may be brought under irrigation schemes, together with rough estimates of costs.
3. In the supervision of construction and carrying out of projects.
4. In the selection of suitable sites for boring operations.
5. Preparing specifications, etc., regarding pumping plants, windmills, and agricultural machinery.
6. Giving general advice on cognate subjects.

Informal advice of a general character will be given to applicants making enquiry by letter or in person. Any applicant desiring professional assistance likely to occupy more than one day should apply for advice in writing. All applicants should specify clearly the nature of the project on which they

seek advice, and should give full particulars as to the distance and direction of their farms from some well-known centre. Applicants will be required to provide suitable means of transport for the officer concerned during the period devoted to work on the spot; to provide any unskilled labour that may be required; and to provide for any other contingent services. Applications should be addressed to the Director of Agriculture, who will endeavour to arrange visits as far as possible in order of application, but with due regard to situation, in order to obviate unnecessary travelling and delay. The services of the Agricultural Engineer are given free, but in cases demanding prolonged individual attention, or repeated supervision, a charge may be made according to circumstances.

Samples

In connection with enquiries, especially with regard to diseases amongst crops, insect pests, soils, grain and the identification of plants, specimens should, wherever possible, be sent, together with full details. It is found that such parcels are often forwarded without any indication of where they are from or why they were sent and it is difficult in such cases to trace the sender. It is, therefore, requested that persons when forwarding samples for examination, indicate clearly their names and addresses on the packages, so as to enable their requirements to be attended to without delay.

The Analysis of Agricultural Products, Soils, Water, etc.

SCALE OF CHARGES.

Arrangements have now been made for the chemical examination of soils, grain, and other produce, oil-seeds, milk, water, fertilisers, etc., on behalf of farmers and others by the Chemist attached to the Department of Agriculture. The charges made, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject, should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

Schedule of Charges.

	£	s.	d.
1. Partial analysis of a manure or feeding stuff, for each constituent	0	5	0
2. Complete analysis and valuation of a manure or feeding stuff	1	0	0
3. Analysis of agricultural products, *e.g.*, grain, hay, roots, etc.	1	0	0
4. Analysis of water for agricultural purposes, irrigation or drainage	1	5	0
5. Partial analysis of soil to determine fertility and recommendations as to manurial treatment	2	0	0
6. Complete analysis of a soil	3	0	0
7. Milk—determination of total fat and solids ...	0	5	0
do. do. of fat only	0	2	6
do. complete analysis	0	10	0
8. Cream—determination of fat only	0	2	6
do. complete analysis	0	10	0
9. Analysis of cheese	0	10	0
10. Limestone—estimation of percentage of lime	0	5	0
do. complete analysis	1	0	0

Remittances should accompany samples submitted.

No charge will be made where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Directions for Taking Samples of Soils.

It is recommended to select four or five spots at least, per acre, taking care that these represent as far as possible the general character of the soil of the field. If the soil of the area to be reported upon presents notable differences, the samples gathered from the different parts must be kept separate.

Having selected a proper spot, pull up the plants growing upon it and remove surface accumulations of decaying leaves, etc., if any. Dig a hole about twelve inches deep and trim one side so as to be smooth and vertical; from the side so prepared remove with the aid of a sharp spade a slice of

uniform thickness—about three or four inches—down to a depth of nine inches. Place the slice on a clean board or cloth and mix thoroughly with similar slices obtained in the same way from other parts of the field area. About six pounds of the mixture are then placed in a clean cloth bag or wooden box. Forward with the sample the following particulars:—

Date of collection, exact location, position (hillside, vlei or flat), peculiarities of soil or sub-soil, behaviour in wet and dry seasons, crops borne, previous manurial treatment, and every circumstance in fact which will throw light on its agricultural qualities.

Directions for Taking Samples of Grains, Produce and Feeding Stuffs.

Grains, meal and feeding stuffs and all agricultural produce should be sampled in the same manner as prescribed for fertilisers.

When the feeding stuff is in the state of cake, select not less than three cakes where the quantity does not exceed one ton, not less than five cakes when the quantity does not exceed five tons, and not less than ten cakes when the quantity exceeds five tons.

Break the selected cakes into small pieces, mix them together, and take the sample—not less than one pound—from the mixture.

Directions for Taking Samples of Fertilisers.

If delivered in bags, select not less than two bags when the quantity does not exceed one ton, and one additional bag for every additional ton.

In no case need more than ten bags be selected.

Empty the selected bags separately on to a clean wooden or stone floor. Thoroughly mix the contents, and set aside one spadeful from each bag, mix together the separate spadefuls, and from the mixture take about one pound as a sample.

If the fertiliser is in bulk, mix together portions taken from the different parts, and draw the sample from the mixture.

Directions for Taking Samples of Water.

All samples should be sent in glass bottles. Stoneware jars are to be avoided. The bottles should preferably be provided with glass stoppers; if corks are used, they must be new and well washed previously in pure water.

In sampling a stream or tank, before taking the samples rinse out the bottle several times with water, taking care to avoid the introduction of mud or sediment.

Before taking a sample of water from a pipe, allow the water to run through it for a few minutes at full pressure.

In all cases, before the sample is taken, always rinse out the bottle several times with the water to be sampled.

Quantity to be taken: 1 gallon.

Directions for Taking Samples of Milk and Cream for Butter-Fat Determinations.

The bulk from which the sample is to be drawn should be first poured two or three times from one vessel to another, and about half-a-pint forwarded for examination.

If it is impossible to deliver the sample in a fresh condition, introduce into each sample bottle about as much of the following preservatives as can be held upon a threepenny piece:—Borax, boric acid or salicylic acid; stating which preservative has been used.

All bottles used must have been previously cleansed with boiling water.

Charges for Dipping Cattle at Government Dipping Tanks.

A charge of 1d. per head is made in respect of all cattle dipped at Government dipping tanks.

Unweaned calves will be dipped free of charge.

Payment may be made in cash or by means of books of coupons at £1, 10/- and 2/6, which can be obtained from Civil Commissioners, Native Commissioners, or through all Veterinary Surgeons and Cattle Inspectors.

The tanks to which these provisions at present apply are the following :—

Salisbury (3), Bulawayo (3), Inyati, Umtali, Penhalonga, Melsetter, Marandellas, Macheke, Mazoe, Lomagundi, Hartley, Gwelo, Selukwe, Enkeldoorn, Victoria, Gwanda, Gatooma, Que Que, Umvuma, Kimberley Reefs.

Lectures for Farmers

The services of certain of the officers of the Department of Agriculture and the Veterinary Department are available for purposes of delivering lectures on subjects upon which they have special knowledge. As far as practicable, lectures will be accompanied by demonstrations at the time or subsequently in the field. Owing to the many calls on the time of the staff and the exigencies of their duties, alternative dates are desirable in order to avoid disappointment. The following topics are offered as examples of subjects that may be dealt with in this manner, but the suggestion of other themes is invited.

Agriculture.—Maize growing; Maize selection and maintenance of the breeding plot; Points of maize and maize judging, with demonstrations; Utilisation of granite vlei soils; Ground nut culture; Rotation crops for home use and for sale; Veld improvement by winter grasses; Production of foodstuffs for the mines; Ensilage; Fungoid diseases of maize and wheat; Wheat, oats and lucerne under irrigation; The prospects of cotton culture in Southern Rhodesia.

Veterinary Hygiene.—Detection and prevention of disease; The care of live stock.

Live Stock.—Judging of cattle according to breeds, and for beef, milk and draught; feeding and kraaling of live stock; general principles of cattle breeding; management of imported stock; grading up of native or local stock with pure bred bulls.

Dairying.—Home butter-making; building and equipment of a farm dairy; handling and marketing of milk; packing and marketing of butter; construction of cow houses.

Swine Husbandry.—Breeding and feeding of swine; some

suggestions for the production of first-class bacon pigs; construction of piggeries at moderate cost.

Chemistry.—The principles of soil fertility; the principles of manuring; the value of lime in agriculture; chemistry of milk and its products (accompanied by demonstrations in milk-testing).

Entomology.—Economic entomology on the farm; the role of insects and their allies in the transmission of disease; scale insects and fruit trees and methods for their control; insect pests and maize; enemies of the potato, insect and fungus; the value and objects of plant import and nursery regulations.

Irrigation.—Methods of applying water to land for irrigation; the measurement of water in connection with irrigation; canal irrigation; storage reservoirs; hints on the selection of sites and on the design of earthen and other dams; irrigation by pumping, with notes on the selection of plants.

Enquiries and invitations should in the first instance be addressed to the Director of Agriculture, Salisbury.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only:—

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultural Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 300. The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E.

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 106. Cultivation and Preparation of Ginger.

No. 126. Turkish Tobacco.
No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. **Tobacco Culture (Virginia)—Harvesting and Curing.**
No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworn, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.

No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.

No. 53. Animals Diseases Consolidation Ordinance, 1904.

No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.

No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.

No. 95. Oestrus-ovis in Sheep, by Alec King.

No. 103. Dipping and Tick-Destroying Agents, by Lt.-Col. H. Watkins-Pitchford.

No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.

No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.

No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.

No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.

No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.

No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.

No. 215. African Coast Fever, by Ll. E. W. Bevan, M.R.C.V.S.

No. 223. A Note on Contagious Abortion, by Ll. E. W Bevan, Government Veterinary Bacteriologist.

LIVE STOCK.

No. 96. Swine Breeds and Breeding of, by Loudon M. Douglas, F.R.S.E.

No. 101. Hints to Dairy Farmers, by J. C. Jesser Coope, F.C.S., N.D.D.

No. 145. Prospects for Importation of Cattle from Australia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 161. Notes on Cattle Breeding, Part III., by R. C. Simmons.

No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.

No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R. C. Simmons.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.

No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.

No. 242. Construction of Dipping Tanks (Revised).

No. 243. Shedding for Milch Cows, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.

No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.

No. 134. Plans and Specifications for Flue Curing Tobacco Barns.

No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.

No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.

No. 157. Hints on Brickmaking, by G. T. Dyke.

No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.

No. 183. The Rainy Season in Southern Rhodesia, by the Rev. E. Goetz, S.J.

No. 184 Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.

No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.

No. 199. Eucalypts for the Farm, by J. J. Boocock.

No. 205. Home Butter Making, by R. C. Simmons.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 213. Hydraulic Rams, by W. Martin Watt.

No. 217. Windbreaks and Hedges, by F. B. Willoughby.

No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 226. Classification of Clouds.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.

No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.

No. 237. The Analysis of Agricultural Products, Soils, Water, etc.

No. 241. Hints on Cement Concrete, by W. M. Watt.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.

No. 246. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist.

Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.

Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.

Game Law: Summary of.

Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Government Notices.

No. 21 of 1917.] [19th January, 1917.

REGULATIONS FOR CONTROLLING THE MOVEMENT OF CATTLE.

1. UNDER and by virtue of the powers vested in him by the "Animals Diseases Consolidation Ordinance, 1904," His Honour the Administrator has been pleased to cancel and withdraw Government Notices Nos. 50 and 189 of 1912, 329 and 383 of 1914 and 259 and 320 of 1916, and to make the following provisions in lieu thereof; provided, however, that areas of infection and guard areas fixed under the terms of Government Notice No. 50 of 1912 shall be areas of infection and guard areas for the purposes of these regulations.

2. The various districts of Southern Rhodesia are hereby declared infected for the purposes of section 5 (2) of the aforesaid Ordinance, and, save as hereinafter set out, all movement of cattle within the said districts is prohibited until further notice.

3. The following shall be regarded as places within the boundaries of which the movement of cattle may be allowed without special permission :—

(a) Single farm.

(b) An area occupied by an owner or lessee, under one management, comprising contiguous farms and situated within an area fixed under section 9 hereof. The mere possession by an owner or lessee of grazing rights over a contiguous farm or farms shall not constitute occupation of such farm or farms.

(c) An area the property of one owner.

(d) For grazing purposes, an area within a radius of four miles of native kraals situated on unalienated land or in reserves, save and in so far as such area includes any private land.

The sites of such kraals shall be deemed to be the places where they are situated at the date of promulgation of these regulations.

(e) An area under the management or control of any Municipality, Sanitary Board or Village Management Board.

4. Notwithstanding the provisions of the last preceding section or of section 9 hereof, the Chief Inspector may, on the outbreak of disease or for such other cause as may be deemed expedient, direct the isolation or quarantine of cattle on a limited area of the aforesaid places.

5. The movement of cattle from place to place may be permitted under the special permission, in writing, of the Controller of Stock, the Chief Inspector, Inspector, Sub-Inspector or other officer or person duly authorised by the Administrator to grant such permission.

6. No permission as aforesaid shall permit the movement of cattle—

(a) Without the written consent of the owners, occupiers or managers of occupied land, and, in the case of native reserves, of the Native Commissioner of the district over which land or reserve such cattle will pass, whether along roads or otherwise; provided, however, that refusal to grant such consent shall be in writing, and provided further that if the Controller of Stock or the Chief Inspector shall consider that such consent is withheld without good and sufficient cause he may permit of movement without such consent.

If any such person mentioned above refuse to give consent or to state a reason for refusing to do so, in writing, no valid objection shall be deemed to exist, and movement may be permitted without such written consent.

(b) Through or to an area without the consent of the Cattle Inspector in charge of such area.

7. Cattle moved to any centre for slaughter under the provisions of these or any other regulations shall, on arrival, be immediately taken to such quarantine area (if any) as is provided for the purpose.

8. Cattle admitted to a quarantine area, in terms of the last preceding section, shall be slaughtered within twenty-one days of the date of admission, and shall not be permitted to leave the same except for the purpose of being slaughtered at the appointed abattoir, and if found outside such area, except for the said purpose, may be destroyed on the order of the Controller of Stock or the Chief Inspector; provided, however, that the Chief Inspector may allow the removal of cattle from such area under such conditions as he may prescribe.

9. The movement of cattle in use for draught purposes may be permitted under the provisions of sections 5 and 6 hereof within the boundaries of areas fixed from time to time by the Administrator; provided, however, that permits issued in respect of such movements may authorise the use of such cattle over defined roads for specified periods.

10. All cattle used for draught purposes, except in the areas defined by section 3, sub-sections (a), (b) and (c), shall be clearly and distinctly branded with the registered brand of the owner.

11. All wagons or other vehicles drawn by cattle, in terms of the preceding sections, shall have the owner's name and address legibly and permanently inscribed on the right side thereof.

12. Whenever the owner, occupier or manager of a farm shall adopt means of cleansing cattle running thereon, either by spraying, dipping or by any other method, the Chief Inspector may order any natives or other persons having cattle on the same farm to cleanse such cattle, and the Native Commissioner of the district within which the farm is situated may enter into an arrangement with the native owners of cattle to cleanse such cattle at a charge to be mutually agreed upon between the said owner, occupier or manager and the said native owners.

13. All permits for the removal of cattle issued under the provisions of these regulations shall specify legibly and clearly on the face thereof the place from and to which such cattle may be removed, the route by which they shall travel, the number of such cattle, the time allowed for the journey, and such other particulars and conditions as it may be deemed expedient to provide.

14. No permit issued for the movement of cattle shall be taken to authorise any trespass in connection with such movement.

15. Notwithstanding the provisions of these regulations, it shall not be lawful for any owner of cattle to allow any such cattle to be on any road, public outspan, commonage, or any property other than that of the owner, unless they are free from ticks. Any beast having ten or more ticks on it shall not be considered free from ticks.

16. The following provisions shall apply to areas infected with African Coast Fever.

17. On the outbreak or suspected outbreak of disease the Administrator may declare an area of infection around and embracing the place of outbreak or suspected outbreak, and a further area or areas around such area of infection as a guard area, whereupon all movement of cattle into and from place to place within such area or areas shall be immediately suspended, except as is hereinafter provided.

(1) In areas of infection and guard areas :—

(a) Cattle in transit by rail may be moved through such area.

(b) Cattle from beyond the borders of Southern Rhodesia may be detrained within such area or areas *en route* to destination for the purpose of being fed or watered or transferred to another truck.

(c) The Chief Inspector may, under such safeguards as he deems expedient, allow cattle to be brought into and thereafter leave any such area for a point outside thereof; provided that they are brought in by rail for the purposes of inoculation or *en route* to their destination.

(d) Cattle for *bona fide* farming, dairy and slaughter purposes may be moved into such area or areas by permission of the Chief Inspector and under such conditions as he may impose.

(2) In guard areas only :—

Cattle may be moved into and from place to place within such area under the conditions of section 6 hereof.

18. A permit for a terminal movement of cattle into an infected or guard area, or from one place to another in a guard area, shall authorise the drawing of a wagon or other vehicle by such cattle.

19. The removal of green forage, hay, fodder, bedding, reeds, manure or of such other articles as may reasonably be supposed capable of conveying infection, shall be prohibited from areas of infection, save and except with the special permission of the Administrator.

20. Every person within an area of infection or guard area, or within such further area as may be specified by Government Notice, owning or in charge of cattle, shall, upon the death or slaughter because of disease, suspected disease or accident of any such cattle, immediately report such occurrence through the nearest Cattle Inspector, Native Commissioner or Police Officer to the District Veterinary Surgeon.

21. In areas of infection no cattle shall be destroyed and no *post-mortem* examination shall be held on any cattle without the consent of an Inspector or Sub-Inspector.

22. Notwithstanding the provisions of these regulations, it shall be competent for the Chief Inspector to authorise and direct the movement of cattle—

(1) for the purpose of isolating, dipping, quarantine or any other such objects as may be deemed necessary to prevent or suppress an outbreak of disease;

(2) for the purpose of obtaining food and water;

at his discretion and under such conditions as he may prescribe.

23. Whenever an area shall have been declared an area of infection or guard area, any person who shall by his own act or neglect or that of his herds allow any cattle to stray or be otherwise removed, except as provided for in these regulations, from any one place within such area to another place, or from a place outside of to a place within such area, shall be guilty of an offence against these regulations.

24. In all areas of infection and guard areas, sheep and goats shall be dipped at such periods as may be directed by the Chief Inspector.

25. Any person contravening the provisions of these regulations or the conditions set out in permits issued thereunder, shall, where no higher penalty has been by the said Ordinance or any other law provided, be liable in respect of each offence to a fine not exceeding £20, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

AFRICAN COAST FEVER.

Areas of infection and guard areas declared in terms of Government Notice No. 50 of 1912.

MELSETTER NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Highlands, Rockwood, Joppa, Clearwater, Nooitgedacht, Randfontein, Avontuur, Enhoek, Ravenswood, Roslyn, Woodstock, Landsdown, Heilrand, Kenilworth, Wolvedraai, Houtberg, Springfield, Quagga's Hoek, Rumble Hills, Groenvlei, Cecilton, Grass Flats, Moosgwe, Lombard's Rust, Diepfontein, Wolverhampton, Johannes' Rust, Helvetia, Ostend, Geluk, Morgensen, Jameson and Rocklands.

(b) *Guard Areas.*

That portion of the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri and the Nyanyadzi River.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri and the Nyanyadzi River.

UMTALI NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Penkridge and Thabanchu.

(b) *Guard Area.*

That portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

GWELO NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Riverbend, Sunbury, Cross Roads, Wegdraai and Reserve.

(b) *Guard Area.*

Bounded by a line drawn from the Gwelo River along the northern boundary of the Main Belt Block to the farm Argyle; thence along the western boundaries of Argyle and Roscobie and from the north-west beacon of the latter in a direct line to the south-west beacon of Summerview; thence along the southern boundaries of Summerview, Hopeton, Leith Hill, Kilkenny, Borisvale and Amiens to the Sebakwe River; thence up the Sebakwe River to the farm Avoca; thence along the western boundary of Avoca, the north-western and south-western boundaries of the Central Estates to the farm Irving; thence along the western boundaries of Irving and Mull to the railway line; thence along the latter to the boundary of the Gwelo Commonage; thence along the easterly and northerly boundaries of the latter to the Gwelo River; thence down this river to the point first named.

SALISBURY AND MAZOE NATIVE DISTRICTS.

(a) *Areas of Infection.*

1. Epworth, Adelaide and Glenwood farms.
2. Sternblick farm.
3. Bluff Hill farm.
4. Borrowdale Estate, Helenvale, Glen Lorne, Luna, Carrickcreagh and Greystone farms.
5. An area bounded by and including the following farms: Belford

Estate, Belford Estate No. 2, Belford Estate North (excluding that portion lying east of the railway), vacant land on which the Jumbo Mine is situated (excluding that portion lying north-east of the fence erected between the farm Whitfield and the railway line), Foyle, Welbeck, 100-acre lots and vacant land, Tjibakwe and Belford Estate No. 3.

(b) *Guard Areas.*

1. An area bounded by and including the following farms: Stamford, Good Hope, Henricksen, Mabelreign and Tynwald.

2. An area bounded by and including the following farms: Naauwplaats, the southern boundary of Belford Estate, Msasa, Great B, Spelonken, Thetford, Balkiza, Willesden, Welston, Teviotdale, Zizalisari Outspan, Avondale, Salisbury Commonage, Hatfield Estate, the eastern boundaries of Glenwood and Adelaide, Ventersburg, Dispute, Donnybrook, Caledonia, Gardiner, Father Hartmann, Chishawasha, The Crag, The Grove, Halstead, Chindamora Reserve, vacant land west of Poorti River, Glenbervie, Maggiesdale, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal and Mooi Leegte.

MTOKO, MREWA AND MARANDELLAS NATIVE DISTRICTS.

(a) *Area of Infection.*

The Mangwendi and Uzumba reserves, in the native district of Mrewa.

(b) *Guard Areas.*

1. The native district of Mrewa, excluding the Mangwendi and Uzumba native reserves.

2. An area in the native districts of Marandellas and Makoni bounded by and including the farms Train, Hornsey, Isleham, Anwa, Soft, Showers, Gongwe, Tiller, Highlands, Allen, Holton Estate, Reserve, White Gombola, Bonn, Calne, Wilton, The Cave, Mere, Naples, Machiki, Eldorado, Percyvale Estate and Monte Cassino.

3. The native district of Mtoko, excluding the main road between Mtoko and the Makaha valley.

Note.—The above areas were declared under the following Government Notices:—Of 1915, Nos. 247, 283, 394 and 438; of 1916, Nos. 66, 128, 155, 213, 243, 253, 275, 396, and 405; of 1917, No. 12.

No. 214 of 1916.] [9th June, 1916.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—on the farm Riverbend, in the native district of Gwelo, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area comprising the following farms:—Main Belt Block farms east of the Long Valley Spruit, Erin, Doon, Krom River, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathfillan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Que and Bembezaan.

No. 225 of 1916.] [23rd June, 1916.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—at Mrewa's Kraal, in the native district of Mrewa, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

No. 32 of 1917.] [26th January, 1917.

UNDER and by virtue of the powers vested in him by the "Animals Diseases Consolidation Ordinance, 1904." His Honour the Administrator has been pleased to provide as follows :—

1. The whole of the Plumtree, Marula Siding and Figtree cattle transport areas, as defined by Government Notice No. 387 of 1914, are hereby declared an area infected with symptomatic anthrax (sponszeikte) for the purposes of the said Ordinance.

2. All movement of cattle, except within the boundaries of a single farm, is prohibited in the said area for a period of one month from the date of publication of this notice.

3. The owner or person in charge shall dispose of the entire carcases of all animals affected with the aforesaid disease by burning.

4. Any person contravening the provisions of this notice shall, where no higher penalty has been provided by the Ordinance, be liable in respect of each offence to a fine not exceeding £20, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

Nos. 381 of 1914 and 200 and 266 of 1916.]

COMPULSORY DIPPING.

UNDER and by virtue of the powers vested in me by section 7 of the "Compulsory Dipping Ordinance, 1914," I hereby declare that the provisions of that Ordinance shall be applied in respect of cattle within the following areas from the date of issue of these Notices, dipping to take place at such intervals as the Chief Veterinary Surgeon shall direct.

The areas under the control of the Municipalities of Salisbury, Bulawayo, Gwelo and Umtali, the Sanitary Boards at Gatooma and Victoria, and the Village Management Boards at Que Que, Melsetter, Penhalonga, Marandellas, Hartley, Enkeldoorn, Avondale, Umvuma, Selukwe, Gwanda, Blinkwater, Plumtree and Rusape.

Further, I do hereby declare that a charge of one penny per head will be made in respect of all cattle dipped at Government dipping tanks, except unweaned calves, for which no charge will be made; and one penny in respect of all horses, mules and donkeys, and ½d. in respect of all sheep.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 7 of the "Animals Diseases Consolidation Ordinance, 1904."

GWELO.

An area comprising the following farms :—Main Belt Block farms east

of the Long Valley Spruit, Erin, Doon, Krom River, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathfillan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Que and Bembezaan.

MREWA

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

BULAWAYO, UMZINGWANE, MATOPOS, BUBI AND BULALIMA-MANGWE.

An area including parts of the native districts of Bulawayo, Umzingwane, Matopo, Bubi and Bulalima-Mangwe, bounded by and including the following farms :—

Lochard Block, Greenlands, Wessels, Allendale B, Oscardale, St. Ninian's, Fincham's, Inyati Reserve, Lortondale, Wynslay Estate, Greville, that portion of unalienated land lying south of a line drawn from the most westerly beacon of Dollar Block and the north-eastern beacon of Killegar, Killegar, Braemar Block, Portive, Robert Block, Induna, Waterfall, Dingaan, Rouxdale, Fundisi, Umkein, Seaborough, Devonby, Helenvale, Slight's, Billar's, Craiglee, Bluebonny, Ireland, Welcome, Paul's Rest, McGeer's Luck, Centenary Mission, Maritzburg, Springvale, Outspan No. 3, Tati Road, De Hoop, Anglesea, Mineral King, World's View, Matopo Block, Brethren in Christ Mission Farm, Absent, the unsurveyed land lying north of a line drawn from the south-east beacon of Absent to the south-west beacon of The Range, The Range, Clark's, Swaithe's, Limerick, Pioneer's Rest, Mayhill, Rietfontein, Bradford, Hamilton, Mayfair, York, Indina, Rathline, Westondale, sub-division A of Fochabers, Fochabers, Kodhwayo, Zimbile and Lochard Outspan.

SOUTH MELSETTER.

All surveyed farms in the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge and Biriwiri, including the Ingorima Reserve and Mafusi Reserve, and excluding the farms Umzelezwe, Nyagadzi, Mhungura, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera.

NORTH MELSETTER AND SOUTH UMTALI.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri, and the Nyanyadzi River; and that portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

SALISBURY AND MAZOE.

An area in the Salisbury and Mazoe native districts bounded by and including the following farms :—Lilfordia, Saffron Waldon, Kilworth, Porta, Reserve, Clement's Plot, Warwickshire, Oatlands, Amalinda, The Rest, Langford, Saturday Retreat, Reserve, Odar, Stoneridge, Longlands, Seki Native Reserve, Dunstan Estate, Banana Grove, Mayfair, Galway Estate, Sebastopol, Gardiner, Gilnockie, Cromlet, Learig, Reserve, Meadows, Mount Shannon, Halstead, western portion of Chindamora Reserve, Pote, Valeria, Spelonken, Arnold's, Smithfield, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal, Mooi Leegte, Reserve, Bitton, Syston, The Lily and Killiemore.

Note.—These areas were declared under the following Government Notices :—Of 1915, Nos. 70, 206, 318 and 355; of 1916, Nos. 215 and 226.

COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 2 of the "Compulsory Dipping Ordinance, 1914."

Enterprise—Salisbury.

An area bounded by and including the following farms:—Halstead, Mount Shannon, The Meadows, Ivordale, Ivanhoe, Oribi, Colga, Neptune Mashona Kop, Mashona Vlei, Vuta, Chinyika, Lonely Park, Grazeley Guernsey, adjoining vacant ground, Cromlet, Father Hartmann, Chisha washa, Stuhm, The Springs, The Grove and Umritsur.

Melsetter and Umtali.

All surveyed farms and the Ingorima and Mafusi reserves, in the native district of Melsetter, excluding Umzelezwe, Nyagadzi, Mhunguru, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera; and including the following farms in the native district of Umtali: Tom's Hope West, Steynstroom, Thabanchu, Penkridge, Macandrews, Cronley and Lisnacloon.

Salisbury, Mazoe and Hartley.

An area bounded by and including the following farms:—St. Mary's, Stoneridge, Odar, Reserve, Saturday Retreat, Chizanza, Suum Cuique, Arbroath, Langford, The Rest, Amalinda, Oatlands, Warwickshire, Clement's Plot, Reserve, Porta, Lyndhurst, Riverside, Herren Hausen, Lilfordia, Killiemore, The Lily, Ballineety, Fairview, Spa, Passaford, Springvale, Mbebi, Umsasa, Great B, Christon Bank, St. Gerera, Willesden Farm, Borrowdale Estate, Luna, Glen Lorne, Gletwyn, Sternblick, Manresa, Caledonia, Sebastopol, Galway Estate, Mayfair, Nalire Reserve, Buena Vista and Seki Reserve.

Makwiro—Hartley.

An area bounded by and including the following farms:—Umfulia, Dorothy Hill, vacant land, Seigneury Reserve, Zimbo Junction, Serui Drift, Strathmore, Scotsdale, Cape Boys' Reserve, Railway Farm No. 22, vacant land between Railway Farm No. 21 and Spencer, Spencer, Railway Farm No. 23, Woodsgift, Railway Farm No. 25, Southwood, Northwood, Niklot, Rothwell Extension, Hunyani Estate, Hunyani Estate No. 2, Stanhope, Cromdale, Garthnor, Serui, Curlewood, Cotswold and vacant land and farms lying within a line from the most easterly beacon of Cotswold to the north-east beacon of Fort Martin, thence to the south-east beacon of Fort Martin and from there due south to the Umfuli River and down that river to the farm Umfulia.

Marandellas and Salisbury.

An area bounded by and including the following farms:—Rakodsi, Longlands, Shepparton (portion of Lendy Estate), Progress, Rockery, Shortlands, Rastenburg, Loquat Grove, Cornwall, Norfolk, Middlesex, Kent, Suffolk, Sussex, Rupture, Argosy, Weir, Inandu, Seaton, Rapture, Sunny Fountains, Mangwendi Mission, Retreat and Springvale.

Shamva—Mazoe.

An area bounded by and including the following farms:—The Carse, Burnleigh, Woodlands, Ceres, Murgwi, Zombi, Chewarika, Maienzi, Maxton, Lone Star Reserve No. 2, Richlands, M. E. D. Reserve, New Brixton, Dillon, Mullingar, Mumwi, Chipoli, Ellerslie, Wolley, Wapley, Lion's Den, and thence from the south-eastern beacon of Lion's Den up the Poorti River to the north-western beacon of The Carse.

Rusape—Makoni.

An area bounded by and including the following farms:—The Willows, The Springs, Howick, Leeuw Poort, Highfield, Emerald, Kirkly Vale,

Lawrencedale Estate, Chimbi, Notgotimyet, Diana, Inyagura, Cheira, Cheira Source, Invercargill, Wick, Makoni Reserve, Mount Zonga, Reserve, Inyamasanga, Windsorton, Manda, Zimati, Mount Tikwiri, Rocking Stone, Lesapi Falls, Recondite, Cheronga and Lesbury.

BINDURA—MAZOE.

An area bounded by and including the following farms :—Wiseacre, Erin, Pimento Park, Duiker Flat, Jesmond Deane, The Ridge, Malvern, Selwood, Marston, Nan Terra, Retreat, Nomansland, Vergenoeg, Caledon, Chiwaridza Reserve, Dengeni, Vredehoek, Arcadia, Hereford, The Vale, Bonny, Wild Dog Valley, Atherstone, Kingston, Hildadale, Cardiff and Poorti Outspan.

HEADLANDS AREA, MAKONI.

An area bounded by the Nyagadzi River from where it intersects the northern boundary of Fairfield Estate, down this river to the Chikore Reserve and along the south-west boundary of this reserve to the Mwaruzi River, and down this river to the Inyongombi River; thence in a southerly direction up this river to the north-east beacon of Rathcline; thence along the northern and western boundaries of Rathcline and western boundary of Bannockburn North, the southern boundaries of Inyati Block and Yorkshire Estate to a point directly opposite to the most northerly beacon of De Vos; thence by and including the farms De Vos, Lone Kop, Moodiesville, Reserve, Netzewa, Fischerville, Wakefield, Urmston; thence up the Macheke River to the southern beacon of Monte Cassino; thence along the southern and eastern boundaries of that farm and from its most northern beacon in a direct line to the south-western beacon of Changwe Ranche No. 1; thence along the northern boundary of Fairfield Estate to the first-named point.

UMVUMA AREA, CHILIMANZI AND CHARTER.

An area bounded by and including the following farms :—Pela, Pansi, Ensimoen, Richmond, Vosges, Kombisa, Kanya, Blackwood, Tshamamvura, Smithvale, Grootfontein, Mtao, Aldebey, Welstead, Lovedale, Central Estates, Sebakwe, Xmas and Bushy Park.

Note.—These areas were declared under the following Government Notices :—Of 1915, Nos. 402 and 423; of 1916, Nos. 21, 22, 98, 126, 159, 208, 370, 373, 460 and 472.

No. 20 of 1917.] [19th January, 1917.

COMPULSORY DIPPING OF CATTLE: MACHEKE AREA.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 23rd March, 1917.

Description of Area.

The Macheke Station cattle transport area as described by Schedule "A" to Government Notice No. 387 of 1914.

No. 22 of 1917.] [19th January, 1917.

IMPORTATION OF CATTLE.

HIS Honour the Administrator has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notices Nos. 186 of 1914, 169 and 342 of 1915, and, notwithstanding any general restrictions on the importation of cattle, to make the following

provision for the introduction of certain classes of cattle from the Cape Province, the Orange Free State and the Transvaal.

1. The following classes of cattle may be imported direct from farms or stock sales approved of by the Chief Inspector in the Cape Province, the Orange Free State or the Transvaal :—

(1) cattle with not more than two permanent central incisor teeth;
(2) cattle, irrespective of age, if entered in a South African Stud Book or appendix thereto, or cattle entered in a Stud Book which were originally imported from Great Britain or Ireland, the United States of America or the Kingdom of the Netherlands.

2. No importation as aforesaid shall be permitted until application for permission to import shall have been made, accompanied by a certificate in the form of the Annexure "A" or "B" as the case may be, and until a permit to import shall have been issued by the Chief Inspector, which may contain such conditions as shall from time to time appear expedient.

3. The importation of cattle from Great Britain and Ireland, the United States of America and the Kingdom of the Netherlands may be permitted under the following terms and conditions :—

(1) a permit shall be required from the Chief Inspector, which may contain such conditions as shall from time to time appear expedient;
(2) importations shall be through and direct from the ports of Capetown or Port Elizabeth.

4. All importations shall be by rail, and for the purposes of importation Bulawayo shall be the port of entry.

5. All cattle imported in terms of these regulations shall, on arrival at Bulawayo, Salisbury or Umtali, be submitted to such examination or tests as the Chief Inspector may direct. If such examination or tests disclose the existence of any destructive disease, the cattle shall be immediately destroyed and the carcases thereof disposed of in such a manner as a Government Veterinary Surgeon may authorise or require. The Chief Inspector may permit of the age restriction and the tests aforesaid being dispensed with in the case of cattle in transit by rail to any place beyond the borders of Southern Rhodesia.

6. All expenses or losses incident to quarantine, examination, testing or destruction as aforesaid shall be borne by the owner of the cattle.

7. Any person introducing cattle in contravention of these regulations or failing to comply with any of the conditions attached to permits to import, or furnishing applications, declarations or other necessary documents known to be false in any material particular, or failing to comply with all lawful directions as to quarantine, examination, testing, destruction or disposal of carcases, shall be liable to a fine not exceeding £20 for each animal in respect of which such offence shall have been committed, and in default of payment to imprisonment with or without hard labour for any period not exceeding six months, unless higher or greater penalties shall have been provided for such offences by the "Animals Diseases Consolidation Ordinance, 1904"; provided, however, that the penalties imposed by these regulations shall not exempt any cattle from destruction in terms of the aforesaid Ordinance.

Southern Rhodesia.

ANNEXURE "A."

IMPORTATION OF CATTLE

entered in a South African Stud Book or appendix thereto, or imported originally from Great Britain and Ireland, the United States of America and the Netherlands.

I,.....residing on the farm.....
in the district of.....in the Union of South Africa, do solemnly and sincerely declare that the.....(number in writing)

animals enumerated below have been in my possession from..... (date), and that lung-sickness has not existed amongst any of my cattle since that date, and that none of such animals is prevented by any regulations or agreement in respect of freight from being exported from the Union of South Africa.

Description of Animals.

Breed.	Sex, name and number in Stud Book.	Country of origin.
.....		
.....		
.....		
.....		
.....		

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of..... 19.....before me,

.....

Resident Magistrate for the district of

.....

Names of former owners.....

.....

.....

Purchaser's name

Place in Southern Rhodesia to which animals are being sent.....

Southern Rhodesia.

ANNEXURE "B."

IMPORTATION OF CATTLE

other than cattle originally imported from overseas and cattle entered in a South African Stud Book.

I,.....residing on the farm..... in the district of.....do solemnly and sincerely declare that the.....(number in writing) animals also enumerated below have been in my possession since birth, and that lung-sickness (contagious pleuro-pneumonia) has not existed amongst any of my cattle nor on my farm during the last four years, and that these animals have never been previously exposed for sale in any public market or stock fair.

Number of animals..... Bulls..... Heifers.....

Breed.....

Seller's name and address.....

.....

Purchaser's name.....

Place in Southern Rhodesia to which animals are being sent.....

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of..... 19.....before me,

.....

Resident Magistrate for the district of

.....

IMPORTATION OF STOCK FROM THE PROVINCE OF THE CAPE OF GOOD HOPE.

WITH reference to Departmental Notice of 28th February, 1912, it is hereby notified that the said Notice is cancelled, and importation of stock

will now be permitted, in terms of Government Notice No. 110 of 1908, from the Province of the Cape of Good Hope, with the exception of the following districts :—

Komgha	Stockenstroom
East London	Queenstown (Gwatyu Ward only)
Peddie	Glen Grey
Victoria East	Maclear
Kingwilliamstown	Elliot Slang River
Stutterheim	Wodehouse
Cathcart	Barkly East

No. 364 of 1914.] [27th August, 1914.

REGULATIONS GOVERNING IMPORTATION OF LIVE STOCK, Etc.

UNDER and by virtue of the powers vested in me by the "Animals Diseases Consolidation Ordinance, 1904," as amended from time to time, I do hereby cancel the regulations published under Government Notices Nos. 295 and 394 of 1908; 38, 61 and 263 of 1909; and 60 of 1911 and 188 of 1912, 47 of 1913, and so much of any other regulations as may be repugnant to or inconsistent with the subjoined regulations, which are hereby declared to be of full force and effect.

1. The importation of the following animals from the respective countries or districts enumerated is prohibited, owing to the existence or supposed existence of destructive diseases affecting the said animals in the said countries :—

(1) All animals and dogs as defined by the aforesaid Ordinance from—

India,
Mauritius,
Persia,
British Burmah,
Assam,
China and bordering countries, including Korea,
French Indo-China,
Dutch East Indies,
Hong-Kong,
Federal Malay States,
The Philippines,
Zanzibar,

and all other countries where surra is known or suspected to exist.

(2) Pigs from the Union of South Africa, the Bechuanaland Protectorate, the Tati Concession, and other countries in which swine fever exists or is suspected to exist, subject, however, to the exceptions contained in the proviso to this section.

(3) Dogs from the territories of Northern Rhodesia and Portuguese East Africa, subject, however, to the exceptions in the proviso of this section.

(4) Sheep and goats from the districts of Albany, Alexandria, Bathurst, Bedford, East London, Fort Beaufort, Humansdorp, Jansenville, Kingwilliamstown, Komgha, Peddie, Somerset East, Stockenstroom, Uitenhage and Victoria East, in the Cape Province; the districts of Barberton, Lydenburg, Marico, Pretoria, Rustenburg, Waterberg and Zoutpansberg, in the Transvaal; Swaziland, Portuguese East Africa, Northern Rhodesia.

Provided, however—

(a) that the Chief Inspector may at his discretion permit the importation of pigs, sheep and goats from the above-mentioned places on production of a certificate signed by a duly authorised Government Veterinary Officer in the form of Schedule "A" attached hereto;

(b) that the importation of dogs required for scientific purposes only may be permitted from the places mentioned in sub-section (3) hereof, by the Chief Inspector, in writing, subject to such conditions as may be imposed by him;

(c) that dogs, sheep, goats and pigs from countries from which importation is permitted may be introduced *via* the port of Beira, provided that all such animals shall be transferred directly after disembarkation to the railway trucks at Beira, and conveyed thence to Umtali without leaving the said trucks.

2. The areas set out in Schedule "B" hereto are hereby appointed for the depasturing and quarantining of animals for slaughter in connection with the places therein mentioned.

3. The several districts of Southern Rhodesia are hereby declared to be an area infected with scab amongst sheep and goats, and the movement of all sheep and goats from any farm to beyond the limits thereof, or from their usual grazing ground within the limits of any town lands or native reserves to any other place, is prohibited, except under the written permit of an Inspector or Sub-Inspector. Such permit shall set forth the number and description of animals to be moved, the route they shall travel, and the period for which the permit shall be in force. In cases where it may be necessary or desirable, the person to whom such permit is issued may be required to cause the animals referred to therein to be dipped before being moved.

4. The introduction of sheep and goats is prohibited except—

(a) as specially provided for by section 1 hereof;

(b) from places not mentioned in section 1, if accompanied by a certificate in the form set out in Schedule "C" hereof.

5. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by rail shall immediately report such arrival to the Veterinary Office at Salisbury, Bulawayo and Umtali respectively, and no such animal shall be detrained at any intermediate station without the written authority of a Government Veterinary Surgeon.

6. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by road shall immediately report such arrival at the Police Camp nearest to the place where such entry is made, and the officer in charge of such Police Camp shall immediately report to the Veterinary Department, which shall direct what steps are to be taken to test such animals with mallein, as in the following clause provided.

7. All horses, mules and donkeys, upon entering Southern Rhodesia, shall be tested with mallein, and the owner or person in charge of such animals shall in all respects carry out the lawful directions of the Inspector while such animals are being tested; provided that this regulation shall not apply to animals in transit through Southern Rhodesia which are not detrained *en route*.

8. Horses, mules and donkeys lawfully in this Territory, and required for purposes necessitating frequent crossing of the border, may be allowed to so cross on such terms as to registration, branding, testing and conditions as the Chief Veterinary Surgeon may from time to time deem expedient to prescribe.

9. An Inspector may direct the thorough cleansing and disinfecting of trucks which may be reasonably suspected of being sources of infection of any destructive disease, and may direct the destruction of truck fittings, fodder, excreta, or other matter or thing which may be reasonably calculated to convey such infection.

10. Any persons contravening the provisions of these regulations, or the instructions or directions given in terms of these regulations, shall be liable in respect of each offence to a penalty not exceeding twenty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months, unless where more or heavier penalties have by the aforesaid Ordinance, or by other regulations framed thereunder, been expressly provided.

SCHEDULE "A."

Certificate.

Issued under provisions of section 1, Government Notice No. 364 of 1914.

This is to certify that the animals enumerated below are, in my opinion, free from any destructive disease, including heartwater; and, to the best of my knowledge and belief, have not been in contact with any infected animals, nor come from, or through, a locality where any such disease is known to exist or has existed for twelve months from date hereof.

Date....., 19...

Place

.....

Signature of
Government Veterinary Surgeon.

Number and general description of animals:

.....Pigs, ...Sheep, ...Goats.

Place from which animals are to be sent:

.....

Owner's name and address:

.....

.....

Place in Southern Rhodesia to which it is desired to send the animals

SCHEDULE "B."

Description of areas set apart for depasturing and quarantining of animals for slaughter.

Salisbury.—A fenced piece of land, 400 acres in extent, situated on the Makabusi River below Maggio's plot, within the Salisbury commonage and towards the southern boundary thereof.

Bulawayo.—That piece of fenced land situated on the Bulawayo commonage between the railway line, to the south, and the Solusi road, adjoining and to the south-west of the Government dipping tank, in extent 1,000 acres more or less.

Gwelo.—Starting from a point where the Ingwania road crosses the railway, along this road past the sanitary stables to a point a quarter of a mile west, thence in a line parallel with the railway to the Gwelo River, thence along the river to the commonage beacon No. 11, thence in a straight line to the Shamrock road where it is intersected by the Scout's Spruit, thence along the Shamrock road to where it joins the Main Street extension, thence along this to the railway line, and down this to the starting point.

Umtali.—A piece of fenced land situated on the old Darlington Farm section of the Umtali commonage.

Penhalonga.—A piece of fenced land situated on plot No. 2, Imbeza plots.

Selukwe.—A piece of fenced land, in extent about 300 acres, situated on the farm Sebanga and adjacent to the township of Selukwe.

SCHEDULE "C."

I, ... residing at
in the district of... in the.....
Colony, do solemnly and sincerely declare that the animals enumerated below are free from any contagious disease, including scab, and have not been in contact with any infected animals within six months from date hereof, and that, to the best of my knowledge and belief, such animals, in travelling to.....† station, will not come in contact with any animals amongst which scab or any other contagious disease exists.

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this..... day of.....before me.

.....

Magistrate, Government Veterinary Surgeon, Scab Inspector, or Police Officer of district from which animals are being sent.

Number and general description of animals being sent.....

Owner's name and address.....

.....

Place in Southern Rhodesia to which animals are being sent.....

† Station within Colony of origin.

ISSUE OF PERMITS FOR THE REMOVAL OF STOCK.

IT is hereby notified for public information that His Honour the Administrator has approved of members of the British South Africa Police issuing permits for the removal of cattle, sheep and goats at the undermentioned stations when no Inspector or Sub-Inspector of Cattle is available :—

Nyamandhlovu.	Mphoeng's.
Gwanda.	Holi.
Plumtree.	Filabusi.
Fort Rixon.	Gwaai.
Belingwe.	Figtree.
Inyati.	Umvuma.
Fort Usher.	Que Que.
Mazunga.	Tuli.
Makwiro.	Sinoia.
Banket Junction.	Buhera.
Makaha.	Beatrice Mine.
Sipolilo.	Wedza.

No. 23 of 1917.] [19th January, 1917.

HIS Honour the Administrator has been pleased, under the provisions of section 5, sub-section (1) of the "Animals Diseases Consolidation Ordinance, 1904," to approve of the appointment of the persons named in the subjoined list as Cattle Rangers for the district of Hartley for the purposes of examining cattle permits, detaining cattle being irregularly moved, detaining cattle infested with ticks and supervising the dipping of cattle in areas under the provisions of the "Compulsory Dipping Ordinance, 1914."

District.	Nominee.
Umsweswe	John William Banner, Umsweswe.
Eiffel Flats	Geoffrey Cotton Woodforde, Eiffel Flats.
Lydia	Reginald Heber Ullyett, Acorn Mine, Gatooma.
Golden Valley	John Mack, Golden Valley.
Shagari	Henry Fenwick Thompson, Shagari.
Umniati	Fred Morgan Linscott, Golden Valley.
Hartley Township	Dennis Handrick, Hartley.
Duchess Hill	Charles Edward Simpson, Concession Hill.
Gatooma—Hartley Road	Robert Appleton Sworder, Hartley.
South of Duchess Hill	William Muter Leggate, Hartley.
Old Hartley—Hartley Road	Frederick Percy Quinton, Hartley.

SCAB IN SHEEP AND GOATS.

IT is hereby notified that the Controller of Stock has, under the provisions of section 29 (1) of the "Animals Diseases Consolidation Ordinance, 1904," appointed the following to be sub-inspectors of sheep and goats in the districts set opposite their respective names.

Native District.	Sub-Inspectors of Cattle.
Bulawayo	R. T. Little.
Bulalima-Mangwe	G. Honey.
Nyamandhlovu	J. Paxton.
Bubi	V. M. Smith.
Umzingwane and Matobo	H. F. Hoste.
Insiza and Belingwe	V. G. Phipps.
Gwanda	R. C. Lowick and H. Graves.
Gwelo and Sebungwe	M. D. B. Crewe.
Selukwe	J. S. Creswick.
Victoria, Gutu, Chibi and Ndanga	J. Whitie.
Chilimanzi	P. C. Cowen.
Charter	G. W. Cumming.
Hartley	A E. Hills and E. C. Weaver.
Salisbury	H. G. Morris and A. P. L. Cazalet.
Lomagundi	S. Alexander.
Mazoe and Darwin	J. J. Kayser and K. Dingwall.
Marandellas	K. A. Leahy.
Mrewa and Mtoko	H. R. Kelly.
Makoni	G. W. Ledeboer.
Inyanga	J. M. McKenzie.
Umtali	W. E. Harvey and J. Allmark.
Melsetter	D. G. Morris.
Wankie	A. Geise.

No. 305 of 1916.] [25th August, 1916.

(As amended by No. 341 of 22nd September, 1916.)

WHEREAS it is necessary to afford facilities for transport with cattle between the Iron Mine Hill, Chilimanzi, Zimutu, Umvuma and Victoria areas as described in Schedule "A" to Government Notice No. 387 of 1914, His Honour the Administrator in Council has been pleased, notwithstanding any regulations to the contrary, to provide that the Chief Inspector may authorise such movement, in writing, subject to such terms and conditions as he may deem fit to impose.

No. 375 of 1912.] [28th November, 1912

IMPORTATION OF POULTRY.

UNDER and by virtue of the powers vested in me by the "Animals Diseases Consolidation Ordinance, 1904," as amended by the "Animals Diseases Amendment Ordinance, 1910," I do hereby declare and make known that the following regulations shall be in force and effect from date of publication hereof :—

(1) All poultry imported by rail shall be inspected by an Inspector or Sub-Inspector at Plumtree, Bulawayo or Umtali.

(2) Should any consignment of poultry shew symptoms of disease, or should such Inspector or Sub-Inspector have reason to believe that any disease exists in, or that infection is likely to be conveyed by such consignment, he may order the detention and isolation of the whole consignment for such period as he may deem necessary.

(3) The Chief Inspector may order the destruction of all poultry which he has reasonable grounds for believing to be diseased or likely to convey infection.

THE following extract from Live Stock Regulations, printed on page 150 of the South African Railways Official Tariff Book, is published for general guidance :—

Poultry are not accepted by rail unless they are placed in a crate and the following conditions are complied with :—

(1) The size of the crate shall be 3 feet 6 inches by 2 feet 9 inches external floor dimensions; for turkeys and geese the height shall be 30 inches; and for fowls, ducks, and poultry of a like size, the height shall be 20 inches.

(2) Each crate must contain two drinking vessels filled with pure water, such vessels to be not less than five inches in depth, of the unspillable type, one being fixed at opposite corners of the coop.

(3) Each crate shall contain two receptacles for food of a suitable size, filled with suitable food other than whole maize.

(4) The birds must not be over-crowded in the crates, and in no case must there be more than 20 fowls, ducks or other birds of a like size, or ten turkeys or geese

(5) Different species of birds must not be placed in the same coop.

Unless coops, crates, and the like are strong enough to bear ordinary transit handling, the Administration will not accept responsibility for loss.

SUMMARY OF THE GAME LAWS.

Game is divided into three distinct classes, described as follows :—

(a) Birds and Small Buck.

(b) Bushbuck, Hartebeest, Impala, Lechwe, Pookoo, Roan and Sable Antelope, Sitatunga, Tsessebe, Waterbuck, and Wildebeest.

(c) Royal Game, which includes Eland, Elephant, Giraffe, Gemsbok, Hippopotamus, Inyala, Koodoo, Ostrich, Rhinoceros, Springbuck and Zebra.

The shooting season for Class "A" is as follows :—

In Mashonaland :

Birds from 1st May to 30th September.

Small Buck from 1st May to 31st October.

In Matabeleland :

Birds and Small Buck from 1st May to 31st October.

To shoot in Class "A" a licence costing £1 per annum is required. This entitles holders to hunt in both Provinces during the open season.

Class "B."—The season opens on 1st July and closes on 30th November in both Provinces. The licence fee is £25 for non-residents and £5 for persons having their domicile in Southern Rhodesia. This licence entitles the holder to shoot up to 15 head, which number may be increased to a total of 25 upon payment of a further sum of £15 in the one case and £5 in the other.

Class "C."—The Administrator may, if he is satisfied that the animals are actually required for scientific purposes, grant to the holder of a game licence permission to shoot or capture any of the species included in this Class. Such permit requires a £5 stamp. Applications in writing, together with proof of *bona-fides*, should be addressed to the Director of Agriculture.

Game for Farming Purposes.—Permits may be granted for the capture of Eland, Ostrich, Zebra or other animals for the purposes of breeding or farming. Such permits require a stamp of the value of £1 and remain in force for six months. Application, accompanied by a sworn declaration, should be made through the Director of Agriculture or the Civil Commissioner of the district.

Game Injuring Crops.—The occupier of any cultivated land or any person acting under the authority of such occupier, may at any time destroy game actually doing damage on such land.

Export of Game.—No living Game or the Eggs of any Game Birds may be exported beyond the limits of Southern Rhodesia without a written permit.

Shooting on Private Land.—A licence does not entitle the holder thereof to shoot on private land without the permission of the land-owner.

Farmers Shooting Game on their Farms.—By taking out a special £1 licence, farmers may at any time shoot any game on their land. "Game" does not include any birds, except ostriches.

Open Area.—The shooting or capturing of all classes of game with the exception of ostriches and other birds classified as game is permitted within the following area in the Hartley district until further notice :—

Hartley District.—From the railway bridge on the Umfuli River, thence north-westwards along the Umfuli River to where it joins the Umniati River, thence southwards along the Umniati River to where it joins the Umsweswe River, thence eastwards along the Umsweswe River up to the drift at the Lydia Mine, thence along the old road from Lydia Mine to Etna Mine and to Inez Mine, thence northwards along the road from Inez Mine to Hartley, thence in the direction of the railway bridge to the starting point on the Umfuli River.

The game specified may be shot in this area without a licence.

Protected Area.—All game is strictly preserved in the Urungwe Game Sanctuary as defined below :—

An area in the Lomagundi district, bounded as follows : On the north and west by the River Zambesi, starting at the point where the Lozenzi River joins the Zambesi, and following the course of the latter river to its junction with the Sanyati River; on the east by an imaginary line drawn from the junction of the Indurune and the Nyaodsa Rivers to the head-waters of the Lozenzi River, and thence along the course of the Lozenzi River to its junction with the Zambesi River; on the south by an imaginary line drawn due west from the point of junction of the Indurune and Nyaodsa to the Sanyati River, thence along the course of this river to where it enters the Zambesi.

Game in Class "A" may be hunted in the close season until further notice on private land in the Melsetter district by holders of a licence.

"Locust Birds" are strictly protected, *vide* Government Notice No. 390 of 1912.

Elephants on Occupied Farms, Melsetter.—The destruction of Elephants when found on occupied farms on the High Veld in Melsetter District is authorised (*vide* Government Notice No. 284 of 1908).

Trespassing on native reserves, in pursuit of game or otherwise, is prohibited, except with the written permission of the Chief Native Commissioner.

Trypanosomiasis.—Persons in search of game in the southern part of the Sebungwe district are warned of the danger of hunting anywhere west of the Sengwe and Lutope Rivers within the fly area, and especially of proceeding anywhere within the valley of the Busi River.

No. 11 of 1917.] [12th January, 1917.

HIS Honour the Administrator in Council has been pleased, under the provisions of the "Game Law Consolidation Ordinance, 1906," to declare that the provisions of Government Notice No. 202 of 1916, under which the operations of sections 9 and 12 of the said Ordinance, in so far as they relate to the killing, hunting or capturing of game in classes "A" and "B" in the native district of Sebungwe, were suspended until the 2nd February, 1917, shall remain in force until the 31st March, 1917.

No. 326 of 1916.] [15th September, 1916.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 4 (2) of the "Game Law Consolidation Ordinance, 1906," to suspend the operations of sections 9 and 12 of the said Ordinance, in so far as they relate to the killing, hunting or capture of game in class "A" in the native district of Wankie, for a period of six months from date hereof.

No. 346 of 1916.] [29th September, 1916.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 4 (2) of the "Game Law Consolidation Ordinance, 1906," to suspend the operations of sections 9 and 12 of the said Ordinance, in so far as they relate to the killing, hunting or capture of game in Class "A," in the native district of Darwin for a period of six months from date hereof.

No. 201 of 1916.] [26th May, 1916.

REWARD FOR THE DESTRUCTION OF WILD DOGS.

HIS Honour the Administrator in Council has been pleased to approve payment of a reward of five shillings for each wild dog destroyed whose destruction is reported and the reward claimed in the manner hereunder set forth.

Rewards will be paid to Europeans by any Magistrate or Native Commissioner and to natives by any Native Commissioner within three months of the date upon which the animal is killed, on a solemn declaration in the form hereinunder prescribed.

In proof of destruction, applicants for the reward will be required to produce and surrender the skin of the animal with the tail not severed.

Form of Declaration.

I,....., do solemnly and sincerely declare that I did, on the.....day of....., and not before, destroy.....wild dog(s) in the district of....., within the boundaries of Southern Rhodesia, and that I am entitled to the reward offered by the Government, and I make this solemn declaration conscientiously believing the same to be true.

.....
Signature.

Signed and declared at.....this.....day of

Before me,

.....
Magistrate or Justice of the Peace.

No. 249 of 1908.] [27th August, 1908.

PROTECTION OF TREES.

IT is hereby notified for public information that any person who shall cut down for use as fuel, or for any other purposes than *bona-fide* farming, mining or manufacturing purposes, or cause to be so cut down the "Wild Westeria" (native name M'Pakwa or M'poea) tree, will be liable to prosecution for contravention of the provisions of the Forest and Herbage Pre-

servation Act, 1859, and upon conviction to a fine not exceeding £100, or to imprisonment with or without hard labour for a term not exceeding six months, or to such fine and imprisonment, or to such imprisonment without a fine.

No. 163 of 1909.] [29th July, 1909.

ANY person who shall cut down or destroy, or cause to be cut down or destroyed, the "Shuma" or "Mashuma" tree, except under written authority from the Estates Office of the British South Africa Company, and subject to such conditions as may be imposed therein, will be liable to prosecution for contravention of the "Forest and Herbage Act, 1859," and, upon conviction, to a fine not exceeding £100, or to imprisonment, with or without hard labour, for a term not exceeding six months, or to such fine or imprisonment, or to such imprisonment without fine.

No. 459 of 1916.] [22nd December, 1916.

WATER ORDINANCE.

IT is hereby notified that, under and by virtue of the powers conferred on him by section 21 of the "Water Ordinance, 1913," His Honour the Administrator has been pleased to approve of the subjoined regulations.

REGULATIONS UNDER SECTIONS 17 TO 21 OF THE "WATER ORDINANCE, 1913."

Irrigation Boards.

1. Whenever two or more owners of riparian land along a public stream or streams desire that in respect of a certain area an Irrigation Board should be constituted, a petition shall be submitted to the Administrator substantially in accordance with Form "A."

2. An Irrigation Board shall consist of such number of members—being not less than three, and which may be increased by increments of two, but not to exceed nine—as the Administrator may from time to time, by notice in the *Gazette*, determine in each case.

3. All owners of land in the area affected by any combined irrigation scheme, or in respect of an area in which a number of irrigation schemes exist, shall be entitled to vote at an election of members of the Irrigation Board for that area.

(a) If any land within the area designated be owned jointly by two or more persons in undivided portions, each or all of them may vote in respect of an irrigable area equal to the total number of acres in the irrigable area divided by the number of owners.

(b) If such land be owned by the British South Africa Company or a corporate body or firm, the person duly authorised under a special power of attorney from the Administrator or the corporate body or by his firm (as the case may be) shall be entitled to vote in respect of that land, and he shall vote as if he were the owner and on the same scale as is applicable to the owner.

4. Every person exercising his right to vote will vote upon the following scale, that is to say, if the irrigable area in respect of which he is entitled to vote be not more than fifty acres in extent, he shall have in respect of each vacancy to be filled at the election one vote, and for every additional fifty acres or part thereof one additional vote.

5. The voters' list for the first election of an Irrigation Board shall be prepared by the Administrator or, on his instructions, by an officer deputed thereto by him. All further voters' lists or revisions thereof shall be pre-

pared by a Magistrate or Assistant Magistrate of the district in which the area is situated.

6. So soon as may be after the issue of any notice constituting an Irrigation Board, the Administrator, by notice published in the *Gazette* and in some newspaper or newspapers circulating generally within the district, shall publish the voters' list, and shall fix and appoint some day and place, named in such notice, for the election of members of the Irrigation Board for such area. The Administrator shall in such notice state the officer he has appointed to be Returning Officer.

Provided always such notice shall be published at least one month before the date of the election.

7. Every person proposed as a member of an Irrigation Board shall be nominated by some voter qualified for such area and shall be seconded by some other qualified voter, and such nomination shall be sent in to the Returning Officer. If the number of persons so proposed be not greater than the number of members to be elected, then the persons so proposed shall then and there be declared to be duly elected, and their names shall forthwith be published in the *Gazette*.

8. In cases where the number of persons proposed shall exceed the number of members to be elected, the Returning Officer shall announce the place or places within the district, and the day, not being less than fourteen and not more than twenty-one clear days from the date on which the nomination period expired.

9. The names of the candidates who have been nominated shall be posted at each polling place for at least three clear days before the day fixed for taking the poll at such place.

10. Every person entitled to vote at the election of any members of any Irrigation Board shall be entitled to vote only in person, and the Returning Officer shall notify voters as to the time of opening and closing of the poll by notice in the *Gazette* and in a newspaper or newspapers generally circulating in the district. The votes shall be given by ballot.

11. The Returning Officer shall enter on a list the name and address of every voter, the value of his vote and the manner in which he votes, and at the close of the poll shall sum up and calculate the number of votes received for each candidate, and shall return the list to the Administrator, who shall, as soon as possible, announce and publish the names in the *Gazette* of the successful candidates in the order of the number of votes cast for them.

12. If two or more persons be found each to have received an equal number of votes, the question as to which of such persons shall be elected or shall rank highest in the poll shall be determined by lot, to be drawn in the presence of the Returning Officer and not less than three witnesses.

13. Members of an Irrigation Board shall be elected for a period of three years and shall be capable of re-election. Any member may resign his place on the Board, and, in the event of such resignation, or in the event of any member becoming ineligible through ceasing to hold land in the irrigation area, he shall cease to be a member of the Board, and on any vacancy occurring on the Board through death, resignation, ineligibility or other cause, the vacancy shall be filled in the same manner as that by which the member was first elected. All the preceding sections shall apply in the event of elections to replace outgoing members.

14. Within one month after the publication of the names of the first members of any Irrigation Board, the Returning Officer shall appoint a day for the first meeting of the Board, and shall cause a notice of the time and place of such meeting to be served on each member of the Board.

15. No business shall be transacted at any meeting unless at least one-third of the whole number be present when the Board shall consist of more than three members, and when the Board shall consist of three members

only no business shall be transacted at any meeting unless two of the members shall be present throughout the proceedings.

16. Every meeting of the Irrigation Board shall be convened by the Chairman or other officer appointed by him on that behalf, by written notice sent by post, or delivered to each member of the Board at his usual address.

The notice shall specify the date, hour and place of such meeting and a copy of the agenda to be considered thereat.

17. A resolution of the Irrigation Board shall not be passed in respect of any subject which has not been included on the agenda attached to the notice of the meeting, unless every member of the Board is present and concurs in the matter being discussed.

18. Any member desiring that a subject be included on the agenda shall lodge notice with the secretary at least 14 clear days before the date of the next regular meeting. No subject which has not been included in the agenda of any meeting shall be considered at that meeting unless at least two-thirds of the members are in favour of its being considered thereat.

19. All questions for the consideration of a Board at any meeting shall be decided by a majority of the votes of the members present at such meeting, and in case of an equality of votes, the chairman shall have a second casting vote. The names of all the members present as well as those voting upon each question at each meeting shall be recorded in a minute book to be kept for the purpose by the secretary to the Board.

20. Every Board shall cause minutes to be made, in books provided by it for the purpose, of all appointments of officers made by the Board, of all orders made by the Board, of all resolutions and proceedings of meetings of the Board, and such minutes as aforesaid shall be confirmed at the next meeting of the Board and signed by the chairman.

21. At its first meeting every Irrigation Board shall appoint a chairman, or an acting chairman who shall have all the powers of a chairman, and a secretary or an acting secretary, and such other officers as shall be deemed necessary. If only acting appointments are made at the first meeting, the Board shall proceed at the first convenient meeting thereafter to make permanent appointments. The secretary and other officers shall hold office during the pleasure of the Board unless they sooner retire or resign.

22. When any notice is required to be given by a Board under this Ordinance, such notice shall be signed by a secretary to the Board, and every such notice purporting to be signed by such secretary and to have been issued on the authority of the Board shall, until the contrary be proved, be deemed to have been issued on such authority.

23. A schedule of areas shewing the extent and quality of the land of each proprietor shall be prepared in accordance with section 19 of the Ordinance and be submitted to the Administrator for publication in the *Gazette*.

24. (1) An Irrigation Board shall have power—

(a) to purchase, construct and maintain such reservoirs, channels or other irrigation and drainage works as it may deem necessary for the proper irrigation and drainage of the land embraced in the area concerned;

(b) to superintend or perform or enter into contracts for the superintendence or performance of all such acts, matters and things as are incidental to the working, control and use of any such works and of any water stored or diverted thereby.

(2) An Irrigation Board is hereby charged with the duty of maintaining all such works and of obtaining and conserving the supply of water therefor, and arranging for an equitable distribution of any water stored or diverted by any such works.

25. Any expenditure to be incurred by the Board shall be repaid in the manner provided by section 19 of the Ordinance.

26. The Irrigation Board may, by such means as it thinks fit, stop any water flowing from any irrigation work under its control on to the land in respect of which any liability to repay a proportion of expenditure under section 19 of the Ordinance is due and unpaid.

27. An Irrigation Board may raise by way of a loan any money that is required by it for the purposes of the Ordinance, but before a proposal for the raising of a loan is laid before any meeting of the Board, not less than twenty-one days' notice shall be given to each member, stating the details of the proposal, and no loan shall be raised except upon a resolution of the Board passed at a meeting at which there are present not less than two-thirds of the members.

FORM "A."

Native district of.....Southern Rhodesia.

Petition for the Constitution of an Irrigation Board.

To H.H. the Administrator, Salisbury.

The petition of the undersigned humbly sheweth :—

1. That your petitioners are the proprietors of land irrigated by the River and situated in the native district of.....

2. That your petitioners propose to irrigate the lands adjoining the River by means of.....which will form a portion of the works in connection with the proposed irrigable area.

3. That in order to effect the proposed works it is expedient that the following area, comprising about.....acres of ground, viz. :—.....
.....
.....
.....

the said area being bounded as follows :—

On the east by.....
On the north by.....
On the south by.....
On the west by.....

be included in the proposed area aforesaid in terms of section 17 of the Water Ordinance No. 13 of 1913.

4. That your petitioners are owners of.....acres of the land proposed to be irrigated within the said area, the whole extent being acres.

Wherefore your petitioners pray that you may be pleased to constitute an Irrigation Board for the above area hereinbefore described.

Signatures of owners.	Names of farms.
.....	
.....	
.....	
.....	
.....	
.....	

No. 466 of 1916.] [29th December, 1916.

AGRICULTURAL STATISTICS.

HIS Honour the Administrator in Council has been pleased, under the provisions of the "Agricultural Statistics Ordinance, 1914," to make further

provision, as hereunder, for the collecting of statistics or estimates in terms of the said Ordinance.

(1) Statistics shall be collected by the Director of Agriculture in relation to live stock, animal products, cattle dipping tanks and areas under cultivation.

(2) The form set out in the annexure hereto shall be used for the purpose of collecting such statistics, and should be completed in accordance with the instructions accompanying the same, by all persons in charge of farms or estates, whether as owners, lessees, managers, servants or occupiers or acting on behalf of such persons, and transmitted to the Director of Agriculture not later than the date fixed in the instructions accompanying the said form.

(3) Any person who without reasonable cause makes default in complying with the requirements of the last preceding section shall be liable on conviction to a fine not exceeding fifty pounds, or in the case of a continuing default to a fine not exceeding one pound for every day during which the default continues.

ANNEXURE.

Southern Rhodesia.

Agricultural Statistics Ordinance, 1914.

LIVE STOCK, ANIMAL PRODUCTS, ETC.

(On the farm on the 31st December, 1916.)

	Total number at date.	Pure-bred cattle included in previous column.	
		Number at date.	Breed.
Cattle:			
Cows and heifers over one year old			
Heifers under one year old, including heifer calves ...			
Bulls in use			
Other bulls and bull calves ...			
Working oxen			
Other oxen			
Horses			
Mules			
Donkeys			
Sheep: Merino			
All other			
Goats			
Pigs			
Poultry, all kinds			
Eggs sold during last twelve months	 dozs.		
Cream ,, ,, ,,	lbs.		
Milk ,, ,, ,,	lbs.		
Butter ,, ,, ,,	lbs.		
Wool ,, ,, ,,	lbs.		
Cattle dipping tanks			

N.B.—In reckoning the quantity of cream and milk sold, please note that six ordinary whisky bottles equal 1 gallon, and 1 gallon equals 10 lbs.

CROPS.

Preliminary estimate for season 1916-1917.

Total area under cultivation.	Area under maize (except maize intended for ensilage).	Area under tobacco.
.....acres.	acres.	acres.

N.B.—In calculating acreage, please note that the length multiplied by the breadth in yards or paces, divided by 4,840, gives the number of acres. That is, for instance, 70 × 70, or 60 × 80, or 40 × 120 yards or paces approximately equals 4,840 square yards or one acre.

Name* of farm (or farms) covered by the above return.....

Signature.....

Full postal address.....

.....

*That is, the original and officially-recognised name which appears on the title deeds and diagrams.

Department of Posts and Telegraphs,

Southern Rhodesia.

Postal Notice No. 12 of 1913.

AGRICULTURAL PARCELS POST.

IT is hereby notified for public information that, on and after the 1st August, 1909, any article produced, and, if manufactured, produced and manufactured within Southern Rhodesia may be transmitted by Agricultural Parcels Post at the reduced rate of threepence per lb. or fraction thereof, up to a limit of eleven lbs. in weight.

The Agricultural Parcels Post is designed to bring the producer into direct communication with the consumer, and is available for the transmission of :—

Biscuits	Dried Meats	Plants
Bread	Eggs	Poultry
Butter	Flour	Seeds
Confectionery	Flowers	Sugar
Cigarettes	Honey	Tobacco
Dried & Bottled Fruits	Jam	Wool Samples

and other articles produced within Southern Rhodesia. It does not extend beyond the borders of Southern Rhodesia.

The senders of articles at the reduced tariff applicable to the Agricultural Parcels Post will be required to sign a declaration that the contents are the *bona fide* produce of Southern Rhodesia.

The limits of size and weight, and the general regulations, are those applicable to the Inland Parcels Post.

G. H. Eyre,
Postmaster General.

General Post Office, Salisbury,
31st March, 1913.

Witwatersrand Agricultural Society.

The Eleventh Annual Show

WILL BE HELD AT THE

Show Grounds, Milner Park, Johannesburg, during Easter week,

4th, 5th, 6th, 7th, 9th & 10th April, 1917—Wednesday to Tuesday.

Classes for Horses, Cattle, Sheep, Pigs, Poultry, Farm and Dairy Produce, and Home Industries (including Needlework); also for Trades and Industrial Schools.

Over £5,000 offered in CASH PRIZES.

Applications for space for exhibition of Machinery, Implements, Vehicles, Motor Cars, manufactured S.A. Products, etc., now being received.

Cheap Railway Fares from all Stations.

ENTRIES CLOSE 10th MARCH, 1917.

The Second Annual Fat Stock and Maize Show and Sale of Pure Bred Stock

Will take place on 5th, 6th and 7th September, 1917.

About £2,000 offered in CASH PRIZES.

Copies of Prize Lists of both Shows and all particulars from the Joint Secretaries.

W. H. POULTNEY.
J. G. TORRANCE.

Box 4344, Johannesburg.

ROYAL DICK VETERINARY COLLEGE,

EDINBURGH, SCOTLAND.

PRINCIPAL - O. CHARNOCK BRADLEY, M.D., D.Sc., M.R.C.V.S.

After attendance on complete courses of instruction in this College, students may proceed to the Examinations for the Diploma of Membership of the Royal College of Veterinary Surgeons (M.R.C.V.S.).

Students of the College may also present themselves for the Degree of Bachelor of Science (B.Sc.) in Veterinary Science conferred by the University of Edinburgh.

A copy of the College Calendar may be obtained on application to—

F. P. MILLIGAN, W.S., Secretary.

N.B.—The College has been transferred to the new buildings at Summerhall, East Meadows.



Mr. Barnes Pope's Homestead, The Springs, Rusape.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—NO. 2.] APRIL, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

GOVERNMENT EXPERIMENT STATIONS.—It will interest farmers who are following the progress of experiments being conducted on the Government experiment farm at the Gwebi to learn that during the current year sixty-three separate experiments are in progress, involving 250 separate plots, from which the returns have to be harvested, weighed and recorded. There are 456 acres under crops, of which 36 different kinds and 49 different varieties are being grown.

The herd of Friesland cattle numbers at present 48 head, and there are 274 sheep.

On the agricultural experiment station at Salisbury, where work of a somewhat different character is conducted, and where 60 acres are under cultivation, the plots, which are of much smaller size, number 300, including over 100 different crops and over 200 distinct varieties. Visitors interested in the investigations going on are at all times welcome to inspect the plots.

Agricultural Congress.—The recent Congress of the Agricultural Union held at Umtali was in several ways noteworthy. Perhaps the most striking feature of the Congress was the general recognition in a number of the discussions of the fundamental importance of scientific research for the advancement of agricultural interest of all kinds. A large number of speakers referred to the great need of experiment farms for the study of problems connected with crop growing and stock breeding and feeding, whilst the desirability of extended facilities for veterinary research was emphasised. Recognition of deficiencies in our information is a sure proof of the attainment of a considerable degree of knowledge by those who seek for more; such knowledge is only to be gained by enquiries made in a scientific manner at first hand, and no one can hesitate for a moment in agreeing as to the desirability of conducting such experiments in the varied branches of pastoral and arable farming and in all matters connected therewith. It is sincerely to be hoped that the general desire in this direction may be realised and take practical form at an early date, in spite of the difficulties both as regards men and money which face us at the present time.

Another matter which aroused keen interest and much discussion was the question of settling soldiers after the war on the quarter million acres of land offered for this purpose by the British South Africa Company. It is satisfactory to be assured that such settlers on their arrival can depend on a warm welcome and practical help from the farmers already established in this country amid the strange methods of farming and new conditions with which they will be faced here.

With these assurances of free land and friendly help, men possessing the necessary qualifications should have every prospect of success.

A third matter of prime importance was the announcement made by Mr. Rawson, on behalf of the committee which has been interesting itself in the proposal to establish a canning factory in this country. The statement was received with very great interest, and the hopes he expressed with regard to early accomplishment of the objects of his committee will be cordially received throughout the country.

Veterinary matters received a considerable amount of attention, as their importance merited.

The farming public at large will await with interest the report of the discussions published in the annual handbook of the Agricultural Union, which will no doubt convey a more amplified account of the discussions than was possible in the daily press.

Dates of Agricultural Shows, 1917.—

Victoria—23rd and 24th May.
Bulawayo—29th and 30th May.
Salisbury—7th and 8th June.
Rusape—15th June.
Umtali—22nd and 23rd June.
Gatooma—27th, 28th and 29th June.
Gwelo—4th and 5th July.

Dhal.—This promising crop is receiving the constant attention of the Department of Agriculture with a view to extending its usefulness and finding what markets exist for the grain. The country of its origin is India, and there the term "dhal" is used to cover several varieties of pulse crops besides *Cajanus indicus*, which we grow here under that name. Consequently the figures for the importation of dhal into the United Kingdom and the Union of South Africa are of little help to us, because they include several varieties other than that we grow. The United Kingdom in five years imported over

four million cwts. of dhal (all kinds) at an average price of 9s. per bag of 160 lbs. We have been asked what place our local dhal should take in the diet of poultry, and, as the result of enquiries, we find that in India this grain is not generally given alone to fowls, as they are not as fond of it as of other grains, and, further, owing to its highly nitrogenous character, it needs to be fed with caution. It is, however, used for poultry food mixed with wheat, maize, kaffir corn and so on with satisfactory results. Rhodesia appears to be about the southern limit for dhal (*Cajanus indicus*), owing to its susceptibility to frost. The Department of Agriculture has, therefore, procured from India seed of several specially early maturing varieties in the hope of overcoming this difficulty. The results of experiments with these varieties will be made known later on.

Immunity: An Appreciation.—The series of articles by Mr. L. E. W. Bevan on the subject of immunity is concluded in this issue. That these articles have attracted attention in professional circles is shewn by the fact that the first one was reproduced in "The Veterinary Record," an English technical journal, and the same journal, on 23rd December, contained the following appreciatory paragraph:—

"A few weeks ago there appeared in our pages the reprint of an article which was published in *The Rhodesia Agricultural Journal* on 'Immunity in its relation to diseases of stock.' It was not 'scientific' in the academic sense, yet it gave the elementary truths of the subject in plain language, with sufficient detail to enable an intelligent man to grasp the main arguments, and with sufficient evidence to carry conviction of the beneficial results to be attained by its use. *It was published in an Agricultural Journal*, and it appeared to be admirably adapted for its purpose. It may be that in those newer lands, where the spaces are wide, the farmers are compelled to a closer attention to veterinary medicine than obtains in this country. It may be also that, as in most new countries, the men are the 'pushers' from the Home brood—are men of better intelligence and possibly of larger capital than obtains generally in Great Britain. Certainly the Governments of our Colonies and Dominions endeavour by these and other measures

to bring home to the agriculturist the advantages to be gained by the use of the skilled advice provided for them."—*The Veterinary Record.*

NATURE NOTES.—The second article in this series, which appears in the present *Journal*, is again on an entomological subject. We do not, as a rule, intend to publish papers on the same branch of science in consecutive issues, as we aim at variety. In this instance a contributor, who had hoped to let us have a geological article, was prevented at the last moment, and we are much indebted to Mr. Pead, of Bulawayo, for filling the gap with his paper on "Cicadas."

FAT STOCK SHOW—CORRECTION.—On page 82 of the February *Journal*, in the table setting out the results of the block test competition, it is stated that Mr. J. E. Dawson's Aberdeen Angus-Angoni cross-bred bullock was bred by Mr. C. C. Macarthur. Mr. Dawson writes to say this is an error, and that the bullock was bred by the Rhodesia Ranching Co. at Darwendale. We regret the error, and hope our readers will note the correction.

INOCULATION.—In the *Agricultural Journal* for December, 1916, we printed a photograph of a "Group of North Devon bulls undergoing inoculation for Rhodesia for Messrs. Austin and Good, Mazoe."

It has been pointed out to us that this superscription might convey the impression that these animals were inoculated by the Government Bacteriologist, Salisbury. This was not the case, and we believe they were treated in the Union.

Prospects of the Maize and Tobacco Crops of 1917.

PRELIMINARY ESTIMATE.

By Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and F. Eyles, F.L.S., Statistician.

The statistical returns furnished by farmers as on the last day of last year indicate a grand total under maize of 203,902 acres, as against 174,647 acres last year, a net increase of 29,255 acres, or 16.75 per cent.

This increase can be regarded as extremely satisfactory, especially in view of the fact that so many of our farmers have gone on active service, shewing, as it does, that those left behind have succeeded in more than maintaining the extent of ground under our staple crop. The position of the leading maize districts will be read with interest. Mazoe returns 53,934 acres, as against 42,939 acres last year, and easily heads the list, being responsible for over one-quarter of the area and 45 per cent. of the total maize in the country; the Salisbury district follows next, with 40,900 acres, as against 36,259 acres last year; and the third place is taken by Hartley, with 20,078 acres, contrasted with 18,515 acres.

Fortunately, the season has been a distinctly good one in those districts in which arable farming is most largely followed, hence our total prospective yield from the area sown may be anticipated to be a good one, in spite of the fact that throughout the country generally, and where maize is less largely grown, the excessive prolonged cold rain early in the season, and the subsequent deficiency of it during the period

of active growth, militated severely against good returns of maize. The similarity of this season to that of last year, which was also very exceptional, is remarkable; two years abnormal in the same direction is a very unusual coincidence. With the important local exceptions indicated above, the season has been somewhat better than last year, but not up to the promise of the commencement of the season. The relationship of the maize crop to the rainfall in different districts offers an interesting field of study for examination later on when more data are available. As these statistics are entirely dependent for their accuracy upon the returns furnished by the farmers, it must be observed that there is an inclination to give optimistic figures of acreage at ploughing time, which, however, appear to shrink materially after harvest. Some deduction for this personal aberration is necessary.

The average yield for every district during the past three years is known, and reports have been obtained from various sources enabling us to compare the prospects of the current season with its three predecessors. On this basis the approximate yield is calculated for each district, and these added together furnish a first approximation of the forthcoming crop for the whole country. This is a somewhat more accurate method than estimating this figure from the total area throughout the country multiplied by a general average factor. Even so, this first estimate is subject to correction according to the remainder of the season and further reports, and ultimately our figures will be checked by the actual returns of the crop furnished by the farmers when it has been shelled. From calculations made in this way, the total prospective crop is now estimated at, in round figures, 950,000 bags, somewhat short of the million which we had hoped for had the season continued propitious. It would be misleading to attempt a more exact figure than these round numbers indicate, and, while framed in a conservative spirit, it is yet possible that adverse circumstances may diminish the total, so that for commercial calculations it would perhaps be well to err on the safe side and reckon 900,000 bags. Even so, this figure compares very favourably with the return of last year, which was recorded at 680,285 bags, against an estimate of 650,000.

Our own requirement for twelve months, excluding native relief, was estimated last year at 575,000 bags, but in view of the large stocks known to be in the country to-day, and the prevailing industrial conditions, it may safely be placed at 500,000 for the coming year. This gives a prospective surplus for export of 400,000 bags, and probably rather more than less. As the export must necessarily be gradual, and is to be conducted again under a system of permits on the above basis, there need be no fear of overstepping the mark, and as later information enables more precise calculations to be made, the exportable quantity can be more precisely ascertained.

The area placed under tobacco this season is reported as 2,275 acres, an increase of over 73 per cent. compared with the previous season. Unfortunately, however, the season has been so unfavourable in the chief tobacco-growing districts that the harvest is likely to be even less than last year, in spite of the increased acreage.

The land under all crops is returned as 254,702 acres, an increase of 51,756, equal to no less than 25 per cent. This is a remarkable advance under present circumstances, and may be due partly to an intelligent anticipation of good war prices for the next year or two, and partly to the stimulus afforded by the knowledge that the Imperial Government is guaranteeing to purchase the surplus of the staple crop.

Districts.	Area under Cultivation, 1916-17. Total Area. Acres.	Area under Maize. Acres.	Area under Tobacco. Acres.
Wankie	1,861	1,426	...
Nyamandhlovu ...	5,155	3,845	12
Bulalima	5,777	4,194	...
Matobo	2,809	1,718	...
Umzingwane	1,382	1,043	...
Bulawayo	3,411	2,348	...
Bubi	4,970	3,649	...
Insiza	8,274	6,457	1
Belingwe	782	558	...
Gwanda	545	500	...
Selukwe	2,752	2,392	...
Gwelo	15,015	12,453	1
Chibi	14	10	...
Gutu	1,703	1,492	2
Ndanga	1,205	995	...
Victoria	4,981	4,095	2
Chilimanzi	4,845	3,311	4
Charter	5,659	3,857	...
Marandellas	9,225	5,040	1,104
Hartley	26,257	20,078	151
Salisbury	48,479	40,900	354
Lomagundi	17,387	14,327	70
Mazoe	60,806	53,934	60
Darwin	420	380	...
Mtoko	35	30	...
Mrewa	2,067	1,403	320
Makoni	10,866	7,987	167
Inyanga	465	337	4
Umtali	5,180	3,677	7
Melsetter	2,375	1,466	16
Total for Rhodesia ...	254,702	203,902	2,275

Maize Grading, 1917.

By J. A. T. Walters, B.A., Assistant Agriculturist.

The grading of maize for export has now been undertaken by the Department of Agriculture since 1914. During the 1916 season it is true that only a small quantity was available for export purposes, but the favourable weather conditions enjoyed by the principal maize-growing districts this season, and the offer of the Imperial Government to accept our surplus maize, makes it likely that a record quantity will be available for shipment from Rhodesia in 1917. Not all maize, however, will be accepted. The Imperial Government confines its offer to maize of the standard required for Grades 1 and 2. These grades are defined below, and the certificates issued by the grader in Rhodesia are accepted by the Imperial Government as a guarantee that the grain is up to the required standard:—

1*st Grade* (F.W.1).—Maize to be sound, plump, dry and well cleaned, with a maximum of together 1 per cent. of discoloured or defective grain.

2*nd Grade* (F.W.2).—Maize to be sound, dry, well cleaned, and to contain not more than 3 per cent. of defective grain, and 5 per cent. of discoloured grain.

The letters "F.W." stand for "flat whites"—the commercial term used to denote white dent maize such as Hickory King and Salisbury White. "Discoloured" is a term that applies to grain of any other colour than white, and "defective grain" is grain damaged by insects, broken in shelling, or otherwise renderd unfit for storage and transit over long distances.

The same price is being paid by the Imperial Government for both grades. This will make the handling of large

quantities a much easier matter, as all grain up to the standard of Grade 2 will be accepted for transport.

In 1915, when large consignments of maize were sent overseas from Rhodesia, the percentages of each grade given in the final returns were as follows:—

1st Grade	44.1 per cent.
2nd Grade	48.7 per cent.
Rejected	7.2 per cent.

Some farmers had less than 1 per cent. of rejections, while others had a very high percentage indeed, one consignment being rejected entirely on account of the grain being too damp for export. With the dryness of our winters, and the practical absence of yellow maize in the country, the quantity of rejections should be very low. Farmers should exercise care and supervision over the work of shelling and bagging, and should remember that not only is the work of the grader thus rendered easier, but his own expense in connection with the cartage of his maize is reduced.

In the report on the grading of the 1915 crop, the principal reasons for the rejections were given as follows:—

(1) *Discoloured Grain.*—This was particularly the fault where a mechanical husker had been used by the farmer, and he was consequently unable to remove any cobs that were partly or entirely discoloured by the weather or by fungus attacks.

(2) *Broken Grain.*—This was a very general defect, due, on the evidence of the farmers, to the faulty working of power shellers, and to defective sieving, as a result of trying to get more work out of the sheller than it was capable of.

(3) *Damp Grain.*—Due presumably to harvesting the grain too early in the season, and remarked more particularly in the maize exported from the Shamva district. The maximum amount of moisture allowed for export is 12 per cent., but it must not be forgotten by farmers that maize absorbs moisture at the coast ports, and that consequently a greater degree of dryness should be aimed at here in Rhodesia. One consignment of maize rejected by the graders was actually covered by a considerable growth of green mould.

(4) *Impurities, such as Dirt, Chaff, Sweepings, etc.*—Although considerable numbers of such bags were found, it is probable that this was due to oversight, or careless handling and mixing of bags, by the farmer prior to despatching to the siding.

(5) *Small Grain.*—There were very few rejections from this cause, but in a great many cases bags that would otherwise be first grade were reduced to second grade as a result of a large admixture of small tip grains. If the sieving is properly done, none of these small grains would pass with the larger ones, and it must not be forgotten that the extreme tip grains are not only defective, but are very frequently of a distinct yellow tinge, which considerably discolours the sample in which they occur.

(6) *Inferior Bags.*—In a few cases second-hand bags were used, and also 2½ lb. bags. These are to be rejected. The farmer cannot expect such bags to convey his grain 8,000 miles.

(7) The presence of weevil was a comparatively minor evil, and as a rule Rhodesian grain, if exported by November, is free of this pest.

(8) Damage to bags from the attacks of ants occurred in some of the parcels graded in December, when the lowest tier on the ground was found to be affected, the bags frequently being considerably eaten into.

During the present season it is proposed to send the graders on tour through the principal maize-growing districts to acquaint the farmers with the standards to be aimed at, and the methods to be adopted with a view to attaining them. It is necessary for the retention of the high reputation which Rhodesian maize undoubtedly enjoys on the Home market, that as much as possible of the maize exported this year should come up to the standard required for first grade. The following simple rules will assist the producers in attaining this end:—

Do not harvest maize before it is thoroughly dry.

It is best to harvest the cob only, leaving the husk on the plant. In this way discoloured cobs can be discarded, and discoloured tips can be removed.

Take care not to overload the sheller, and do not feed more rapidly than the sieves are able to receive and treat effectively.

Do not mix sweepings and small grain with the bags destined for export. It only means unnecessary cartage to the station.

Use only new 2½ lb. bags, which should be doubly sewn, leaving lugs at the corners by which the bags can be handled. The needle should be passed through the base of the lugs at least once.

Stack the maize at the station in tiers six high and two deep, with the sewn ends outwards. If maize is ridden in late in the season, it is a wise precaution to lay corrugated iron on the ground, to prevent damp and white ants from getting at the bags.

Napier's Fodder.

We are informed that Napier's fodder has been established on most of the Government experiment farms in New South Wales, and that it promises to be a valuable addition to the fodder plants of Australia.

Transmission of Cattle Trypanosomes by Flies other than Tsetse.

By H. E. Hornby, M.R.C.V.S., D.V.S.M.,
Government Veterinary Surgeon, Fort Jameson.

So long ago as 1857, Livingstone, in his "Missionary Travels and Researches," described the effect of the tsetse's bite on cattle and horses. It was in 1895 that Bruce demonstrated the role that trypanosomes play in the diseases set up by such bites. Since then, it has been amply demonstrated that wherever tsetse are found, there, *as a rule*, domestic mammals cannot flourish or even exist. This rule holds good in spite of the numerous exceptions recorded, such as cattle living in "fly" zones in parts of West Africa and the Soudan, donkeys living under similar conditions in East Africa, and goats and dogs being found in many fly-infested districts throughout the whole of Central Africa. Stated otherwise, it is the rule that wherever tsetse are found, a percentage—fortunately a small one—of them will be found to harbour trypanosomes pathogenic to domestic animals.

So far as Central Africa is concerned, the converse of the rule holds good to a great extent; so that where no tsetse are found one does not expect to meet with domestic animals affected with trypanosomiasis. The intimate association between tsetse and Central African trypanosomes is instanced by the fact that Duke found trypanosomes in only one game animal out of thirty-nine shot in a tsetse-free area, and this may have wandered from a fly zone; whereas of fifty-two game animals shot in tsetse districts, ten were infected.

These rules holding good for Rhodesia, it came somewhat as a shock that Montgomery and Kinghorn, in 1908, should

come to the conclusion that "trypanosomes may be transmitted by *Glossina morsitans*, *Stomoxys calcitrans* and a specimen of *Lyperosia*." In an able article published in this *Journal* in 1910, Bevan contested this view, quoting several instances where fly-stuck and healthy cattle had intermingled in the presence of biting flies other than tsetse without the disease spreading. Our knowledge of trypanosomes and trypanosomiases has advanced so much since 1910 that a fresh survey of the subject of this article is permissible.

The minute animal parasites known as trypanosomes are found all over the world infesting every class of vertebrate host. Laveran and Mesnil in their standard work on the subject (1912) describe some fifty species as occurring in mammalian blood. Of these, *less than a dozen* are known to be transmitted by tsetse flies, a large proportion of the trypanosomes, in fact, occurring in countries where there are no tsetse.

According to Bruce and his collaborators, the trypanosomes causing disease in man and domestic animals in Central Africa may be divded into three groups and seven species:—

Group A.—*Trypanosoma Brucei* group—

(1) *T. Brucei.*
(2) *T. gambiense.*

Group B.—*Trypanosoma pecorum* group—

(1) *T. pecorum.*
(2) *T. simiæ.*

Group C.—*Trypanosoma vivax* group—

(1) *T. vivax.*
(2) *T. capræ.*
(3) *T. uniformæ.*

The species forming *Group A* are all more or less polymorphic, varying in size and shape from short and stumpy forms, without free flagella, to long and slender forms, with free flagella. The cytoplasm contains numerous dark-staining granules. The centrosome is small, and is situated as a rule some distance from the posterior extremity. The undulating membrane is well developed and thrown into bold folds. Development in the tsetse fly takes place first in the intestine;

afterwards the parasites pass into the salivary glands, and there complete their development into infective forms. This is the only group in which the salivary glands are invaded. This group can be separated from the others by shape alone.

Group B.—The trypanosomes forming this are small and monomorphic. The cytoplasm is non-granular. The centrosome is prominent, subterminal, and often seems to project beyond the margin. The undulating membrane is fairly well developed. The cycle of development in the tsetse fly begins in the intestinal tract; afterwards the flagellates pass forward into the proboscis of the fly, and finally reach the salivary duct or hypopharynx, where they complete their development and become infective. The salivary glands are never invaded.

Group C comprises monomorphic species remarkable for the extreme rapidity of their movements. The posterior extremity is enlarged. The cytoplasm is clear. The centrosome is large and terminal, and the undulating membrane is little developed and simple. The cycle of development takes place at first only in the labial cavity of the proboscis, and later in the salivary duct or hypopharynx. No part of the cycle takes place in the intestinal tract or in the salivary glands.

It is not within the scope of this article to discuss the validity of the above scheme, but I may mention that some authorities consider it too condensed, even when the term "species" is used only in the sense of "grande espèce." It is probable, too, that at a later date another group will have to be added, and that then the present use of the term *T. Brucei* will undergo modification. For the present, however, we may accept Bruce's contention that "the three groups are well marked, and it is fairly easy by microscopic examination alone to name what group a trypanosome belongs to when seen in the blood of the vertebrate host or even in the tsetse fly."

All three groups are represented in Rhodesia, and the trypanosomes that have been isolated from cattle are *T. Brucei*, *T. pecorum* and *T. vivax*. Experience of cattle fly-stuck in almost every part of N.E. Rhodesia, and in the adjoining parts of N.W. Rhodesia, Nyasaland and Portuguese East Africa, has shewn me that the vast majority of fly-stuck cattle in

these areas are infected with *T. pecorum;* only comparatively few have been found to contain *T. Brucei* or *T. vivax.*

In the descriptions quoted above it was made obvious that the trypanosomes in question are true parasites of (*i.e.*, are able to live and multiply in) both mammals and tsetse flies. Also, just as only a comparatively small number of mammals are true hosts of any one species of these trypanosomes, even so only a small number of flies, and all these included in the genus *glossina*, act as true hosts. In a district where *T. pecorum* and *Glossina morsitans* are both common, it would be found, if all the mammals and flies were examined, that only comparatively few of both harboured trypanosomes, nearly all the infected mammals being ruminants, and all the infected flies being *glossinæ*. Further, not all ruminants nor all tsetse are susceptible; and in any fly belt it is rare to find more than 50 per cent. of the ruminants and 5 per cent. of the tsetse flies infected.

A glance at the figures will give some idea of the constituent parts of the proboscis of a blood-sucking fly. The labrum-epipharynx and labium together form a tube through which the blood is sucked, and known as the labial cavity. The hypopharynx lies in a groove on the floor of the labium, and is pierced throughout its length by the salivary duct, the opening of this duct being thus near the tip of the proboscis. Even when not feeding, the labial cavity is constantly filled with a liquid believed to be salivary secretion. After inserting its proboscis into the skin, and before commencing to suck up blood, the insect injects a small quantity of saliva, either directly from the hypopharynx or from the accumulation in the labial cavity. This fluid is very irritant, as we all know from painful experience.

After any biting fly has fed on blood rich in trypanosomes, most of the blood is in the mid and hind gut. Only a residue remains for a brief space of time in the anterior portions of the alimentary canal, including the labial cavity. Digestion of the blood is completed in from one to three days. The fate of the contained trypanosomes depends on (1) the nature of the fly, and (2) the nature of the trypanosome.

Imbibed by a glossina, "*T. Brucei*," according to Bruce,

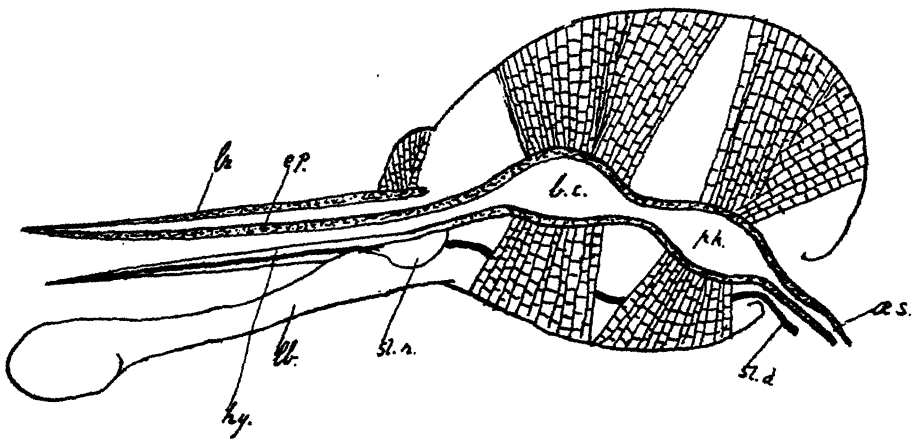
"retain their shape and infectivity for some eighteen hours. They then degenerate and lose their power of infection, and as a rule have disappeared altogether from the majority of flies by the fifth or sixth day. In a small percentage of tsetse flies the trypanosomes maintain their position, they continue to multiply, and in a short time swarm in the alimentary canal of the fly. These multiplication forms bear little or no resemblance to the original trypanosomes. After some twenty or thirty days the developing flagellates find their way into the salivary glands, resume their blood form, and regain their infectivity.

"*T. pecorum*, under the same conditions, develops first in the gut and then passes forward into the labial cavity of the proboscis, and finally reaches the salivary duct or hypopharynx, where the trypanosomes revert to the original blood form and become infective.

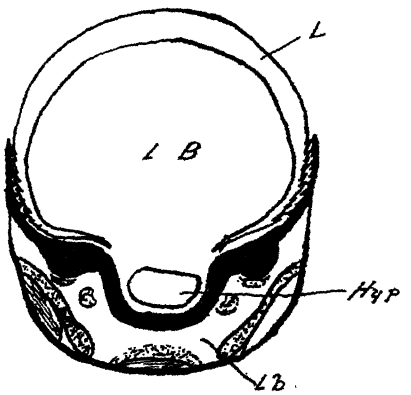
"*T. virax* develops first in the labial cavity of the proboscis, and later in the salivary duct or hypopharynx."

Imbibed by non-susceptible flies, all trypanosomes undergo the same fate. They retain their shape and infectivity for a period rarely exceeding twenty-four hours, after which they degenerate, and by the time all the blood is digested they have disappeared.

There are at least three methods by which a fly may act as a transmitter of trypanosomes. It, as in the case of tsetse, may be a true host, the hypopharynx of which swarms with trypanosomes, so that whenever it bites an animal it is bound to inoculate the same. On the other hand, as we have seen that even in non-susceptible flies trypanosomes retain their infectivity for some hours, if immediately after feeding on an infected animal any biting fly alights on and inserts its proboscis into another susceptible animal, then with the extrusion of the drop of saliva it is possible that an odd trypanosome or two, left in the labial cavity after the last feed, may be swept into the wound, and the animal become *mechanically infected*. Instances of infection occurring in this way have been recorded when the interval between the two feeds is more than twelve hours, but the vast majority of successful experiments have been with flies transferred straight from the one animal to the other. Indeed, it is obvious that the chance of



Scheme of the mouth parts of a blood-sucking fly (after Patton & Cragg)—lr., labrum; ep., epipharynx; hy., hypopharynx; lb., labium; sl.r., salivary reservoir; b.c., buccal cavity; ph., pharynx; sl.d., salivary duct; œs., œsophagus.



Transverse section of proboscis of Glossina (copied from Roubaud)—L., labrum-epipharynx; L.B., labial cavity; Hyp., hypopharynx; Lb., labium.

success is in inverse proportion to the length of time that has elapsed between the two feeds. Another method by means of which a beast may be mechanically infected by flies is through non-biting, blood-sucking flies transferring trypanosomes on their feet or proboscis from a sore on one beast to that on another. We all know how excoriated dogs' ears get during the summer, and how constantly the animals are plagued not only by biting flies but also by non-biting flies resembling house flies. Just so with cattle: in the summer one frequently sees these hæmatophagous muscids feeding on the drop of blood that exudes from the place where a tabanus or hæmatopota has just bitten; in fact, I have seen one such fly resting *on the back* of a large tabanus, waiting for this latter to draw blood. For mechanical infection to be effected by these flies, the two animals would have to be very close together, as desiccation would kill within a few seconds all trypanosomes that might adhere to the feet or external parts of the proboscis.

It is by mechanical infection that the trypanosomes of surra are transferred from one animal to another, as was shewn by Rogers in 1901, by the Sergents in 1906, and Leese in 1909. Quoting from Laveran and Mesnil's book: "Surra is propagated by different biting flies, tabanus, hæmatopota and stomoxys; *T. Evansi* is transmitted and inoculated by these insects, but it does not appear to accomplish in them any evolutionary phase comparable with that of *T. gambiense* in glossina." In like manner the propagation of murrina—a disease of equines in Central America, due to *T. hippicum*—is ascribed by Darling to mechanical infection by hæmatophagous muscids, when these fly from a sore on one beast to a sore on another.

Thus far, then, we have demonstrated that many trypanosomes can be, and frequently are, transmitted mechanically by flies other than tsetse. It only remains to be shewn that the Central African trypanosomes can be, and frequently are, transmitted in a similar manner.

In his original investigations, before anything was known about the cycle of development that takes place in tsetse flies, Bruce transmitted nagana by means of tsetse that were made to bite a clean animal within forty-eight hours of feeding on an infected one. After a longer interval than forty-eight

hours, the flies were not infective, because, as we now know, all blood-forms had commenced their developmental cycle. Mechanical infection by glossinæ is not strictly analogous with mechanical infection by flies other than tsetse, because in the one case the trypanosomes remain healthy, and for some species (*T. vivax*) the labial cavity is a predilection seat, whereas in flies of other genera the trypanosomes are in an unhealthy environment, and tend to die out rapidly. It has been stated that the proboscis of stomoxys is uninfective one-and-a-half minutes after the fly has fed on surra blood.

In 1910 Jowett, referring to outbreaks of trypanosomiasis due to *T. congolense* (*pecorum*) in Portuguese East Africa, wrote:—

(1) "In all cases outbreaks of the disease have occurred in a herd after the introduction of new members brought from a distance, and which may have been subjected *en route* to the attack of one or other species of glossina."

(2) "In all cases it seems clear that, following the advent of the imported cattle, locally-bred animals of mature age, which have never previously shewn signs of illness, have contracted the disease in localities in which there is no evidence of the presence of glossinæ."

In 1911 he was able to shew that either stomoxys or hæmatopota, though probably the latter, was capable of transmitting mechanically the trypanosome in question.

In 1914 Owen demonstrated almost conclusively that a trypanosomiasis of cattle in N.W. Rhodesia was spread by species of tabanus, and equally good evidence was produced by Jones in 1915 anent the spread of trypanosomiasis in cattle near Beira by tabanus or hippobosca.

Balfour in the Soudan and Bruce in Nyasaland are both convinced of the important part that mechanical infection may play in spreading outbreaks due to *T. pecorum*. The latter blames tabanus and hæmatopota, but considers that the evidence that stomoxys plays a similar role is unsatisfactory. Braum (1914) says that, in what was German East Africa, it is possible that in addition to tsetse flies, other biting insects (stomoxys and tabanids) can transmit *T. pecorum* (*congolense*).

In 1914 I inoculated a dog with a strain of *T. Brucei* vel *rhodesiense*. In due course numerous trypanosomes appeared in its blood. Cohabiting with it was another dog, and both animals were so much worried by stomoxys and hæmatophagous muscids that soon their ears were badly excoriated. By and bye the uninoculated dog fell sick, and examination of its blood revealed numerous trypanosomes typical of those found in the other animal.

The farming district of Fort Jameson is a "fly-free" area almost completely surrounded by "fly." It is not a matter for surprise then that outbreaks of trypanosomiasis are constantly being reported from its periphery. I was soon impressed with the disproportion between the large number of animals affected and the small number (frequently nil) of tsetse that had been seen in the neighbourhood of the outbreak. Making all allowances for bad herding and straying cattle, it seemed impossible that, as was frequently the rule, an entire herd of fifty cattle could be infected by tsetse that no one had ever seen. Granted that the initial cause of the outbreak was a beast stuck by a stray tsetse, it seemed probable that the disease was spread in the herd by some other agency. Then again, I have travelled through a district in December, just as the rains were starting, and of a thousand village cattle examined I have found less than a dozen to be fly-stuck. I have travelled in the same district six months later, and found that five hundred of those previously examined were either dead or very ill from trypanosomiasis—on neither journey did I see a tsetse fly, although I know that from time to time odd ones are to be seen close to the district in question. This seasonal occurrence of the disease, coincident with the biting fly season, is significant.

To shew how irrational it is to attribute the whole of a large outbreak of trypanosomiasis to hypothetical tsetse, I may mention that I have camped for a month with three hundred cattle in what was actually a thin "fly" belt, where several times a week I saw tsetse within three miles of the kraal, and twice I caught flies at the kraal itself, yet during that time less than twenty cattle were fly-stuck. Knowing, as we do, that of any glossina population less than 5 per cent. are infective, is it not absurd to attribute hundreds of cases of trypanosomiasis to the tsetse that no one has ever seen?

Finally, as the last piece of evidence to be advanced, I know of more than one estate where, since the danger from mechanical infection has been realised and measures taken to isolate all fly-stuck cattle, no fresh cases occurred during the last summer, although during each of the three previous ones severe outbreaks had been the rule.

The explanation of those instances when for long periods fly-stuck animals have been herded with healthy ones without spreading the disease is that, as is often the case, the infected animals' blood was practically free from trypanosomes, or the requisite species of flies (tabanus and hæmatopota) were not present in sufficient numbers to bring about the thousand-to-one chance there is that any given fly will succeed in mechanically infecting a beast during a season, or the herding has been so good that the animals were not bunched. There may be some other explanation, but it matters not, for no amount of negative evidence can invalidate the large amount of positive evidence that has accumulated, and but a tithe of which I have set forth.

The practical conclusions are obvious, and need not be laboured. It is unwise for a man to let cattle infected with trypanosomes run with his other cattle at any season, but particularly during the summer. On the other hand, the mere passage of fly-stuck animals in the vicinity of healthy cattle is not fraught with danger to the latter. We must take due care, use common sense, and not get panic-struck.

Note.—With regard to the conclusion that in certain circumstances trypanosomiasis in domestic animals is transmitted by biting flies other than tsetse, whilst this may be true for some areas, it is a very rare occurrence in Southern Rhodesia, where, as the result of the practical observation—no tsetse, no trypanosomiasis—it has not been found necessary to impose any veterinary regulations in respect to this disease. —C.V.S.

Winter Wheat.

By J. A. T. Walters, B.A., Assistant Agriculturist.

Like any other corp, wheat requires moisture for its culture. This may be provided in any one of three forms—natural rainfall, irrigation, or the presence of moisture in the soil.

The first form occurs in Rhodesia only during the summer months. Unfortunately at this period wheat is liable to attacks from rust—a fungus which does not flourish in winter. A few varieties of wheat are able to withstand this rust to some extent. Of these *rust-resistant* wheats, the best discovered up to the present for Rhodesia is the variety known as Yellow Cross.

Irrigation is available to a limited extent in Rhodesia, and where available forms an ideal means of growing wheat during the winter months. Any variety may be used for the winter crop, and water is applied to the land a few days previous to sowing (if necessary), and subsequently every three or four weeks until the crop is mature. As little water should be given as is consistent with the healthy growth of the plant. There is no merit or virtue in over-watering, merely because the water supply may be plentiful.

The third method of growing wheat is only practicable in naturally moist situations, such as vleis. Such situations may, however, also occur on the side of a slope. These vleis are usually too wet for summer crops, and as a rule can only be "worked" either before the rains in October or November, or after the rains in March, April or May. It is essential for the growing of winter wheat that the moisture be retained at least until September. In the case of wet vleis which dry up soon after the rains are over, the growing of winter crops of any kind is not feasible. The moist vleis mentioned above are an asset to Rhodesia, the full value of which has not yet been appreciated by the farmer. It is known that, with the

judicious application of fertiliser, yields of six bags of grain per acre have been obtained, although the average yield under these conditions is likely to be only 2 to 3 bags per acre. At the enhanced prices that are likely to rule for wheat during the coming season, these yields afford an extremely remunerative return, when it is considered how cheaply this crop can be handled compared with maize.

The first essential, then, is the location of suitable land. In certain districts it is known to be plentiful, and the farmer as a rule has a very fair idea of how long it will keep moist. If the situation is clayey, there is a danger that the surface soil will crack to a considerable extent, leaving exposed fissures, which conduce to rapid evaporation. Such vleis must be regarded with caution, and if experience shews that they dry up in mid-winter, they should be avoided altogether. In loam or in humus lands there is every probability of the moisture being retained through the winter, and such situations constitute the ones that experience has shewn to be suitable for winter wheat.

The seed bed for wheat needs to be well prepared. Ploughing in February should be followed by cross ploughing or disc-harrowing; and shortly before planting another light harrowing should be given, followed by a second light harrowing immediately after sowing. If the soil is sandy, and inclined to be loose on the surface, rolling is desirable, so that the seed bed be firmed, and the water drawn up to the young plants. Rolling or harrowing may be repeated until the plants are 8 inches high.

Every crop has its risks and dangers. With winter wheat on moist land these are two—first, danger from frost, especially at the critical time of flowering, which may lead to no grain forming in the ears (Dutch—"dove aare"); second, a similar result, due apparently to physiological causes, but not really understood, frequent with wheat on black humus soils, so-called peat or "torf."

If wheat grows so fast at first as to be in danger of frost, it may be grazed over by sheep and calves, which will retard its growth, and also incline it to stool out.

The wheat generally grown in this country is Early Gluyas. This variety can safely be recommended for any

district, and usually ripens in September or October, according to as it is sown in March, April or May. Other varieties have done equally well in certain districts. Among these may be mentioned Klein Koren, Wol Koren, Els Koren and Zwartbaard. Whatever seed is used, attempts should be made to secure pure strains, as otherwise considerable differences in date of ripening may occur, involving loss in harvesting.

On some of the vleis where vegetation is very rank and humus is plentiful, the soil is frequently sour or acid. In such cases applications of lime have proved beneficial. In other cases where the soil is inclined to be poor, dressings of artificial manure have been shewn to be advantageous. The form of manure recommended is a complete fertiliser, which may be applied at from 75 to 100 lbs. per acre.

Harvesting is usually done with a mower, or, in the case of small areas, with sickles. The crop may be safely cut before the grain is perfectly ripe, as it will fill out while standing stooked in the field. Threshing may be done at leisure, and the subsequent winnowing suffices to prepare the grain for the market. Besides tramping by animals or treating with sticks, hand threshing machines and winnowers are generally used in this country, and, in the case of considerable areas, steam power is necessary. It frequently happens, however, that it is impossible to obtain these implements from local dealers, and the farmer often feels that his crop does not justify the expense involved in buying them. To meet such cases, the Government has agreed this season to advance threshers and winnowers at cost price to farmers on certain terms, viz., one hand-power thresher, capable of threshing about five bags per diem, and a hand-power winnower of corresponding capacity, to be paid for in part after the crop is reaped and in part a year later.

Reductions in railway rates on wheat have been announced as follows:—

(1) 300 miles and upwards, 1d. per ton per mile in ten ton lots.
(2) 1½d. per ton per mile in smaller quantities.
(3) Under 300 miles the rate varies with the distance, thus for 100 miles it would be 1.40d. per ton in ten ton lots, and 1.71d. per ton in less than ten ton lots.

Production of Winter Wheat on Granite Formation in Rhodesia.

By Cecil Wilmot, Schoongezicht, Marandellas.

The farmer at the outset should satisfy himself that the grass growing on the area he contemplates cultivating in the vlei is green, and starts growing immediately the frost stops. Next he should make sure that the ground is not too wet, or contains too much clay. As a guide, one may take land to be suitable in most cases where rice has been planted by the natives in former years, the ridges of which can be plainly seen. In fact, the knowledge that the soil will retain moisture is indispensable.

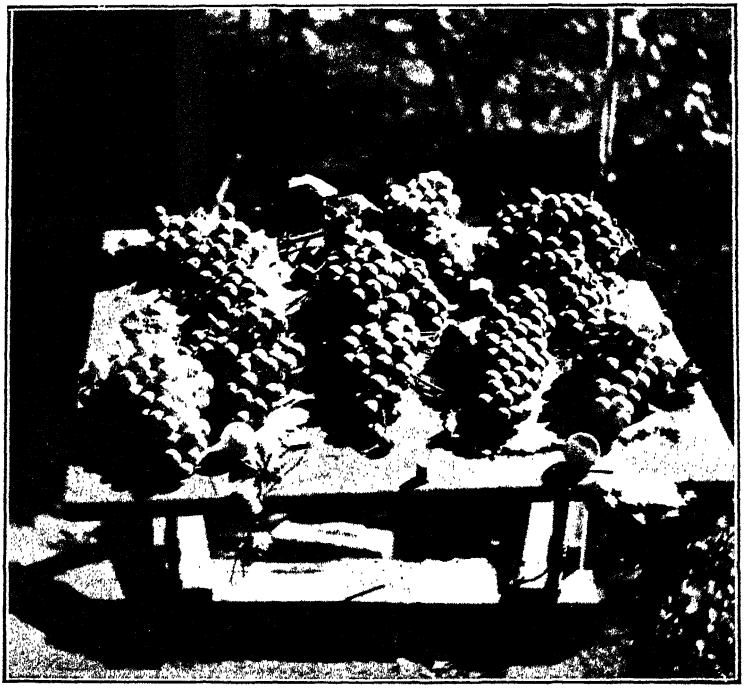
If these essentials exist, the next point is to assist in retaining the moisture, by preventing surface evaporation. The only means is a good tilth. Owing to the amount of roots and the length of the grass ploughed in, unless the land is ploughed a few months in advance and left to lie open to rot and sweeten up the soil, as all our vleis are sour, it is difficult to obtain a tilth sufficiently deep to be in direct contact with the soil not touched by the plough. In other words, an air space will occur between the surface turned in and the hard unploughed bed, which will act as a waterproof sheet, and prevent all capillary action from below, consequently the loss of all surface moisture.

Being winter, direct evaporation of moisture by the sun is not very noticeable, provided the tilth is a good one, and when the hot months draw near, the crop itself acts as an umbrella.

In determining the soil most suitable for wheat, I should



"Early Gluyas" Wheat, Mr. Bernard's Farm, Headlands.



Grapes grown by Mr. J. Campbell Rodger, Bulawayo.

say sand every time, but if it has a small amount of soil mixed with it, you will get a heavier crop; on the other hand, if too much soil, especially of a clayey nature, it will remain too wet, and wheat cannot stand wet feet. In most cases a slope of the hill is better than below in the vlei.

My seven years' experience on sandy soil in this country (but more in the old Cape Colony) has proved conclusively that one must not plough vlei soil deep, as if you bring to the surface the unproductive sand, you will be doomed to failure.

In spite of the drought last year, I fed wheat during the greater part of winter to my milch cows, and find, so far as my farm is concerned, that it is the heaviest crop of green forage I can raise per acre on the sand, after testing the same class of soil with seven different kinds of oats three years ago However, a small crop of barley wheat beat it last year, and I think the latter will be sown more extensively when its adaptation to moist vlei is found out, and the possibility of its use as a substitute for wheat.

The soil to avoid, I am told, is heavy soil, or black soil that contains clay, as the wheat stalk will grow well, but not produce any grain. Generally speaking, I have been cropping drier soil every year, and I think the tendency is to find too wet a spot in which to sow, which means a low stand and many small stools.

To obtain a certain crop, apply farmyard manure; one will reap very little without it, and a quick method is to spread it from the wagon. Possibly some brother farmer will give his experience with artificial fertilisers.

Do not sow too thickly in the sand, or stooling will be checked, though the time of sowing is the only guide in this respect, for as the spring advances it will stool more, and less seed per acre may be sown.

If the surface soil is on the dry side, plough in the grain, but if sufficiently moist, harrow it in; the former process seems to give a more even stand.

If possible, obtain seed that has not been grown under irrigation, and my experience so far, after trying different

kinds, including Rietti, is that Els Koren does the best in the moist vleis; it produces a whiter flour than the hard varieties, including Klein Koren.

The time to sow, to a great extent, depends on the nature of the soil. I generally put my first lot in by the 15th of February on semi-moist ground, and continue to about the 1st of June. May I think the best month, but the February crop can be harvested early, and one can sow mealies on the ground, which, having had manure, will produce a good crop.

My object in sending this is merely to state my experience in the hope that it may be of some use to others, and that some of your readers by doing likewise will enable us all to gain some knowledge of the possibilities of wheat growing.

To Encourage Wheat Growing in Rhodesia.

Messrs. A. F. Philip & Co., Ltd., Agricultural Implement Merchants, of Salisbury and Bulawayo, announce the offer of a prize to stimulate wheat production in Southern Rhodesia, consisting of a McCormick reaper and binder suitable for wheat and other cereal crops, delivered free on rail at Bulawayo, to be presented to the farmer growing the largest quantity of wheat during the present year, and subject to the terms and conditions indicated below.

The offer is open to any farmer in Southern Rhodesia, and the prize will be awarded for the largest quantity of sound, marketable wheat, harvested at any time during the year 1917, threshed, winnowed and bagged, actually produced by him, not grown by tenants or on shares or under any other arrangement on his behalf.

A sworn affidavit signed before a J.P. will be accepted as proof of compliance with these conditions.

All competitors must lodge their claim for the prize, accompanied by the declaration referred to, on or before 7th January, 1918, with the Director of Agriculture, Salisbury, whose decision shall be final.

If required to do so competitors must be prepared to permit inspection of the grain, and the land on which it was grown, to any person authorised in writing thereto by the Director of Agriculture, who has been invited to act as adjudicator by Messrs. A. F. Philip & Co., Ltd.

The reaper and binder offered by Messrs. A. F. Philip and Co. is a valuable farm implement, which should be of great service to any farmer who grows wheat or other small grains on a large scale, and we hope there will be very keen competition for the handsome prize so generously offered.

Statistics of Live Stock and Animal Produce

FOR THE YEAR 1916.

By Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and F. Eyles, F.L.S., Statistician.

We publish this month the annual statement shewing the numbers of live stock owned by Europeans in Southern Rhodesia, the quantities of animal produce sold off the farms, and the number of cattle dipping tanks in use.

Before making comments on the figures, it may be mentioned that the statistical returns are being sent in with an increasing regularity and promptness which shew that farmers appreciate the value of statistical work on their behalf, and are co-operating with the Agricultural Department to make the same as accurate as possible.

Our list of farmers is continually being corrected as information reaches us, but we can hardly hope to make it quite perfect because of the frequent changes of which we often receive no advice. We earnestly appeal to those few farmers who have neglected to send in returns, and have not responded to the circulars they have received, to comply with the law without further delay, for we sincerely hope we may never be compelled to take steps to enforce the same.

Occupied Farms.—The number of farms covered by the returns is 2,178, a slight increase on last year's figure of 2,145. That agriculture is not going back, nor is even standing still, in these abnormal times must be considered satisfactory, and is a sure indication that a more rapid advance may be expected when the war ends and confidence is restored. Of these

farms, frequently more than one is in the hands of a single individual; the total number of working farmers is, therefore, considerably less.

Dipping Tanks.—The number of cattle tanks has now reached the figure of 761. There is now more than one tank to every three occupied farms, and as in many cases two or more farms are worked as one and use the same tank, while numbers of farmers use their neighbours' tanks, it follows that considerably more than one-third, possibly one-half, of all European-owned cattle are regularly dipped. Certainly the proportion of cattle in Rhodesia that are systematically dipped must now be a high one. We wish to lay stress on this point, because the rapid spread of the practice of dipping is a mark of real progress far more solid and re-assuring than mere increase in the number of live stock, satisfactory though the latter may be. To build up large herds is good business, but to safeguard those herds against epidemic disease is even sounder practice and establishes confidence.

Compulsory dipping is rapidly extending, but has been so recently adopted in many districts that there has not yet been time for all farmers to supply themselves with tanks. There is, therefore, every reason to anticipate a material increase in the number during the present year and before the next enumeration is made.

Cattle.—The total head of cattle owned by Europeans is shewn as 468,504, an increase of 73,648 over last year's figure of 394,856, or a difference of over 18 per cent. The native-owned cattle are now estimated at 491,522, or an increase of about 10 per cent. over last year's total. This makes a grand total of cattle at 31st December, 1916, of 960,026, the gross increase being 119,100 head, equal to a little over 14 per cent.

If we take into consideration that Rhodesia possesses horned stock approximating to one million head, and at the present rate of increase this figure will be passed during 1917; further, that this valuable asset is insured against destruction by epidemic disease by the progressive spirit of the farming population, which is adopting the best preventive measures known to science; and if we next proceed to examine the report on the excellent reception accorded to a trial shipment of Rhodesian beef made last year, of which an account appears

in this *Journal;* then we may say, without being charged with undue optimism, that the future of Rhodesia as a producer and exporter of beef is indeed a rosy one.

The increase of cows and heifers over one year has been at the rate of 17 per cent., that of heifer calves 32 per cent., and that of stud bulls 14 per cent. Working oxen, as returned, remain at practically the same figure as before, but this is probably not quite correct, for it will be seen that the new column for "Other Oxen" totals 69,047, or more than the sum of working or "trained" oxen. There is reason to believe that the meaning of these two columns has been misunderstood, and in future we shall ask for particulars of oxen under the two heads, "Trained Oxen" and "Other Oxen." A comparison cannot be made between bull calves in 1915 and 1916, and the same remark applies to bulls other than stud animals, because in 1915 these were included in a miscellaneous column for bulls and oxen. A true comparison can only be made by taking the sum of the following three columns in our 1916 statement, viz., "Bulls other than Stud and Bull Calves," "Trained Oxen," and "Other Oxen," and comparing the total with the sum of two of the 1915 columns, viz., "Working Oxen" and "Other Bulls, Oxen and Bull Calves." The total for 1915 was 151,928, and for 1916 173,665, or a difference equal to an increase of 16 per cent.

Of the districts, only one—Gwelo—carries over 40,000 head of horned stock; four others, ranking in the order given, possess between 30,000 and 40,000, viz., Hartley, Mazoe, Victoria and Insiza; five other districts have over 20,000 each, ranking as follows: Gwanda, Salisbury, Chilimanzi, Charter and Lomagundi. There are ten districts carrying under 20,000 and over 10,000 head; eight districts with from 1,000 to 10,000; and only two districts with less than 1,000 head of cattle.

Pure-bred Cattle.—In 1915 the total of pure-bred cattle of all breeds was given as 1,925, but in 1916 this figure leaps to 5,274, a surprising increase of no less than 173 per cent. We confess we were not prepared to find so great an addition, but we see no reason to doubt the accuracy of the figures sent to us. The most notable difference is in Africanders, the bulls being 562, as against only 34 last time, while Africander cows are

returned as 1,242, against 163 in 1915. The Bulalima, Gwanda and Insiza districts are chiefly responsible for this big advance. This breed is now moved from the fourth to the first place among the pure-breds. It may well be that the term "pure-bred" is used in this case in a relative sense, for of course but few of these Africander cattle are entered in the stud book of the breed.

Shorthorns shew the very satisfactory increase of about 100 per cent. for both bulls and females. The total for the breed is 1,266, compared with 1,804 Africanders. Bubi is still the leading district for Shorthorns, with 230 head, followed by Insiza with 140, Mazoe 137, and Salisbury 122.

Frieslands occupy the next place, with a total of 933, and have now passed North Devons in the race, the latter breed totalling 477 head. Herefords retain their position in the fifth column with a total of 384. The rate of increase for these three breeds is as follows:—Frieslands, 276 per cent.; North Devons, 54 per cent.; and Herefords, 112 per cent.

The same five breeds that were in the lead in 1915 maintain their place as a group at the head of the pure-breds, although relative to one another there has been, as explained, some shuffling. Between them, they make up about 92 per cent. of all pure-bred cattle in Rhodesia, amounting to 4,864 out of a total of 5,274.

Frieslands appear to be the favourite European breed in Bulawayo district, which has 244 head, while in Salisbury this breed runs the Shorthorn close with a total of 114 head. North Devons are most found in Nyamandhlovu, where there are 190; while the headquarters of Herefords is also Nyamandhlovu, with 75 head.

In addition to the European breeds enumerated in the table, we have received returns of thirteen Red Polls and three Jerseys.

Equines.—Very little change has taken place in the numbers of horses, mules and donkeys, except that there is a decrease of 649 in the total of mules. This is accounted for by recent purchases for the East African campaign.

Sheep, Goats and Wool.—There is very little difference in the number of goats, though 1916 shews a small increase.

With regard to sheep, a satisfactory advance is to be noted, Merinos being 11,901, as against 10,141, and other sheep 50,470, as against 40,081, the latter being an increase of 25 per cent.

The wool sold has increased by 2,518 pounds, or at the rate of about 7.5 per cent. This does not appear to bear any direct proportion to the number of woolled sheep kept, for the Merino flocks have grown at the rate of 17 per cent.

Poultry and Eggs.—The number of poultry shews a considerable decrease, namely, from 117,230 to 101,141, a difference of nearly 14 per cent. The figures seem to indicate a retrograde movement in the poultry industry, which is to be regretted, in view of the fact that Rhodesia still imports large quantities of poultry produce. On the other hand, the number of eggs sold off the farms has increased from 126,610 dozen to 141,580 dozen, equal to a direct increase of 11 per cent. The improvement relatively—that is, the proportion of eggs sold to the number of poultry kept—is, however, much higher. In 1915, only 1.08 dozen eggs were sold per head of poultry per annum. In 1916, this has risen to 1.4 dozen, or nearly 1½ dozen per head per annum. We may hope that this points to the industry being placed on a more economical and productive basis.

Dairy Products.—Our figures may be regarded as shewing that the dairy industry is in a satisfactory and progressive condition. The sales of fresh milk, the most profitable branch of the industry, have grown from 2,189,068 pounds in 1915 to 2,976,630 pounds in 1916, or an advance of nearly 36 per cent. The amount of butter sold direct to consumers has decreased by 72,603 pounds, but this is more than counter-balanced by the quantity of butter fat (cream) that has been sold to factories, which has increased by no less than 162,437 pounds.

In addition to the dairy products shewn in the table, 12,407 pounds of cheese have been made according to returns received.



Wickson Plum.

The Rhodesian Farm Orchard.

By A. G. Turner, Government Citrus Adviser.

There are many situations in various parts of Rhodesia that are entirely suitable to commercial enterprises for planting oranges and other citrus fruits, also in some localities situations are to be found that could be laid down to commercial apple orchards. In this article, however, I propose to deal purely with the general purpose, or utility, orchard for the farm and town plot.

It seems to be the idea of many people and farmers in this country that fruit trees once planted can be left to forage for themselves. The orchard is covered with grass and weeds the greater part of the year, and gets an annual scratching, which is called a ploughing or cultivation, as a sort of reminder that something is expected of it in the way of a return. The trees under these conditions naturally give no satisfaction, and the owner of such an orchard will tell you it is no good growing fruit trees, as they never produce any fruit worth having. I am alluding to the home orchard to be found on almost every farm in the country, and, if this principle of neglectful attention were paid to the main farming operations, it stands to reason that the farm could not be expected to give even a bare living. On the other hand, one finds many orchards that would be a credit to any country, being well cared for in every way, and these give ample returns to the grower.

I think I am right in saying that fruit is an essential part of the white man's diet in this country, if he wishes to keep himself and his family in good health. It is possible by careful selection of varieties of different kinds of fruit to have some sort or other fit to eat practically the whole year round

in many parts of this Territory. Every farmer should select a suitable site for an orchard of assorted fruit trees; if it can be irrigated, so much the better; if no water is available, fruit can still be produced in sufficient quantity for his household use, provided the trees receive proper attention otherwise. The land selected for the orchard should be thoroughly cleared of stumps, roots and rocks, and the surface levelled off to as nearly an even grade as possible over the whole area, so as to facilitate the after cultivation. If the orchard is to be irrigated, and it is certainly advisable even for a home orchard, levelling very materially assists the application of water. The object to be aimed at is to level off ant heaps and any other uneven spots, the earth from which is used to fill up depressions, with a view to obtaining a comparatively even surface. This should be taken in hand, if possible, the season before it is intended to set out the trees, as also the thorough breaking up of the soil by ploughing, and if sub-soiling can be done so much the better. Following on these operations, the land can be kept well harrowed and cultivated during the dry season, so as to be in good condition for planting out in the spring of the year. The next thing to be done is to stake out the site, using any system of alignment which is suitable to the ground or fancied by the individual as the best for his particular purpose, and which will at the same time give a general symmetrical appearance. In this respect I think I may say that there are few things on a farm which shew up to such advantage as a well-laid-out orchard, provided, of course, it is well kept up in the way of cultivating, fertilising, and, when necessary, spraying. An orchard carefully planted with good varieties and well looked after is a big asset on any farm, while a neglected patch of trees is a discredit, and might often depreciate the value of an otherwise good farm, for the reason that a prospective buyer might say to himself, "This man pays little or no attention to his home necessities and surroundings; how do I know that his other lands have not been worked after the same careless methods?" On the other hand, a really useful well-kept orchard may set off some of the deficiencies of an otherwise mediocre place, and is, moreover, a pleasure to the owner and his family.

When the trees are planted, they should be cut back and watered immediately, and the stems protected either by white-

washing or covering with old newspapers or grass; the latter, being rather inclined to attract ants in many places, should not be used if other means are available. The reason for this protection is to keep off the fierce rays of the sun from the dry ground, which are more harmful to young trees than later in the summer when rains are falling. The young trees should receive a regular application of water, and the ground be kept loose around them until the rains come along in sufficient quantity to get down to their roots.

During the wet season it is not advisable to do more cultivation than absolutely necessary, as the punching down of the soil in its wet condition and consequent damage to roots often does more harm than good. The best plan is to allow the weeds to get up a little after the first rains, turn them under with a plough, then sow beans, vetch or anything else as a cover crop which will improve the condition of the soil. Towards the end of the wet season, this cover crop should be ploughed under, and left to rot in the ground, which takes place fairly soon if the ground is well ploughed in a moist state. The usual practice in ploughing in beans as a cover crop is to commence when the plants are in bloom, or a little over, but it is possible on a small area to allow the beans to just ripen, pick the pods and cut up the plants, which have got a bit wiry by this time, with a disc harrow, followed by a plough to turn them well under.

As soon as the rains are over, and right through the dry season, it should be made a practice to cultivate the orchard regularly, say every fortnight, in order to conserve as much moisture in the land as possible. To attain this object, it is no use going over the land several times, following one cultivation after another, and then leave it for, say, six weeks untouched.

Speaking generally, fruit trees should be pruned in this country from May to June, and unless this operation is done regularly and thoroughly, the result will not be satisfactory. The tendency I find here, as a rule, where pruning is done at all, is merely to behead the trees, that is to say, to cut back very severely or very lightly, according to the individual's own ideas, and do practically no thinning out at all, the consequence being that a top of rank growth is formed so dense

that there is little or no opportunity of growing good bearing wood. As a general principle, it is better to do more thinning out than heading back; this applies more particularly to peaches, plums and apricots for their annual pruning. Apples and pears require to be severely dealt with in this country for the first few years, until they have formed a really solid foundation on which they can carry their future crops, after which time very little pruning is necessary, except a little thinning out and cutting away any broken or damaged limbs. Little knowledge of the proper pruning of fruit trees can be acquired by reading, as each tree of each different kind presents almost a new problem, which experience alone teaches one how to tackle.

Irrigation is a most decided advantage in a Rhodesian home orchard; for a commercial undertaking it is, of course, absolutely essential. If water is available, it should be applied to young trees as soon as the buds are swollen, so as to supply as much vigour as possible to the tree to make its new growth, and if only one watering can be given, this is the time to give it, but if possible it should be continued at regular intervals, never allowing the ground to get really dry, but on the other hand, never swampy, until the rains occur. The same principle practically holds good for older bearing trees, if a full crop of good fruit is desired. If, however, it is not possible to irrigate regularly, it is certainly advisable and worth the trouble of watering the trees before blooming, so as to get a good "set," and once again to fill the young fruit out and give them a chance to hold out until Providence supplies the needful amount later on. Whatever happens, the ground should be well worked up after an irrigation, as soon as it is dry enough to use whatever implement is most handy and satisfactory, so as to prevent evaporation, which is very high indeed at this time of year in this country, and thus conserve all the moisture possible for the use of the tree.

I propose to append a list of fruit trees of various kinds, and varieties of each sort, which I have found to be generally doing best and bearing good fruit in different localities of Rhodesia. I may say that, in most cases, the varieties which are most satisfactory in the middle and low veld of this Terri-

tory are almost identical with those doing well in similar regions of the Transvaal.

The ripening period of each variety of the different kinds of fruit is shewn by the order in which it is placed, earliest being first under each heading.

I would impress on intending planters the necessity for ordering trees from nurserymen many months before it is necessary to plant, and to insist on the nurseryman supplying what is asked for, and not being put off with something "just as good." Also deal with a nurseryman who has a reputation to keep up.

Oranges—Washington Navel, Jaffa, Mediterranean Sweet, Joppa, St. Michael, Malta Blood, Valencia Late and numerous seedlings.

Naartjes—Old Cape, Dancy's Tangarine, Bombay, Emperor.

Lemons—Genoa, Villa Franca, Eureka.

Grape Fruit—Triumph, Marsh's Seedless.

Kumquat—Nagami.

Limes—Mexican, Tahiti.

Pawpaws—Large Round.

Mangoes—Sabre, Peach, Beira (large green).

Avocados—Green, Red.

Bananas—Lady's Finger, Common Natal.

Plantains—Common.

Pineapples—Smooth Cayenne, Common Natal.

Guavas—Red and White Large Indian, Red Chinese (small).

Persimmons—Among.

Loquats—The Advance (large improved).

Grenadillas—Mammoth Fiji, Common.

Tree Tomatoes—Common.

Apricots—Alpha, Early Cape, Royal, Blenheim and various seedlings.

Peaches—Peento, Angel, Waldo, Mamie Ross, Pallas, Florida Crawford, Common Yellow Clingstone (seedling) and other seedlings (freestone).

Plums (Jap)—Methley, Burbank, Shiro Smomo, Wickson, Satsuma.

Pears—Keiffer (possibly Boulhretien, Beurre Hardy, Easter Beurre).

Apples—Jonathan, Cleopatra, Versveld, Wemmer's Hoek, Rome Beauty, Ohenimuri.

Quinces—Cape Selected.

Almonds—I.X.L.

Figs—Common Brown, Castle Kennedy, Adam.

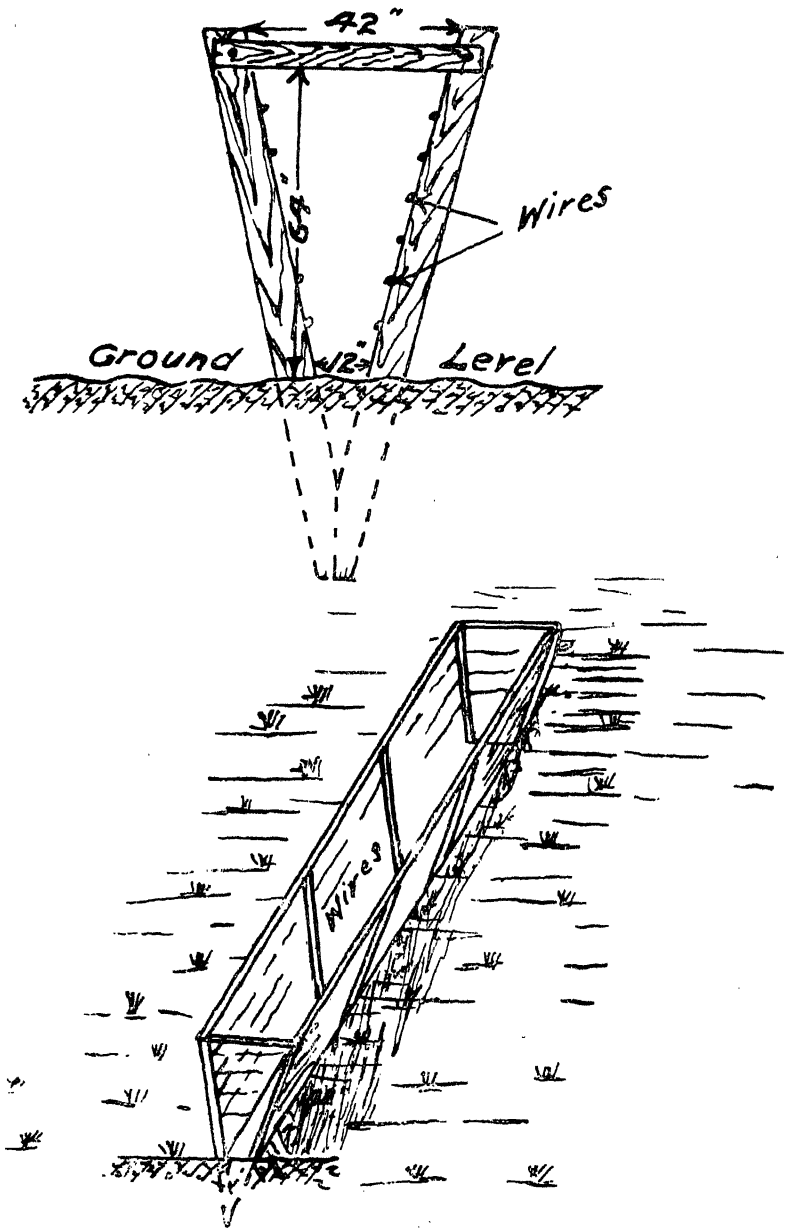
Walnuts—English, French.

Grapes—Red Muscatel, Red and White Hanepoot, Hermitage, Catawba (Isabella) Barbarossa, Waltham Cross.

Strawberries.

Blackberries.

Loganberries.



Hay Rack.

A Useful Hay Rack.

A simple and practical device for feeding large numbers of cattle in winter on the veld is in use on Mr. R. Bernstein's farms Chitora and Bluewater, in the eastern portion of the Salisbury district. The common practice of allowing cattle to pull hay direct from the stack at their own sweet will is wasteful and dangerous. The stock trample and foul much good hay and there is a distinct danger of some being buried alive, whilst the weaker or younger animals are apt to be driven away from the limited space round the stack.

The hay at Bluewater is brought as required from stacks, where it has been cut and conveniently stored near the lands in summer, to the hay racks distributed at various convenient spots about the ranch. The rack consists of any number of pairs of native wood posts, about 10 inches in diameter and 9 to 10 feet long, placed at intervals of 10 feet, their lower ends buried in the ground and touching one another, forming a V, about 12 inches apart at the ground level, the upper ends, which stand 5 feet 6 inches above ground, being about 3 feet 6 inches apart, and kept so by a horizontal stay, as shewn by the accompanying diagram. On the inside of these posts six plain wires (No. 8 gauge) are carried along like a fence, the lowest being about 11 inches from the ground, the others at intervals of 9 inches, forming a crib into which the hay is thrown from a wagon. The total length depends on the number of stock to be fed at a time. The posts are buried in the ground to a depth of about 3 feet 6 inches to 4 feet, and, in place of round holes, a short trench has to be dug to receive each pair. Hard wood cut in winter, soaked in the dipping tank, and the butts charred or tarred before erection, is recommended. After prolonged experience, this hay rack has been found eminently satisfactory for winter feeding of stock running on the veld.

Rhodesian Beef on Smithfield Market.

Full particulars are now to hand as to the result of the export of twenty-two carcases of Rhodesian cattle which were purchased by the Commercial Branch of the British South Africa Co. at the Johannesburg Fat Stock Show in September last. These were slaughtered and sent to London as a trial shipment of Rhodesian beef.

Below we give the brokers' report, the account sales, a statement of the financial result and a report upon the shipment by Mr. R. Walsh.

The results may, we think, be considered highly satisfactory. The margin of profit would have been even better had not a certain proportion of the meat been rejected as the result of poor dressing. This is an error that can easily be rectified.

Copy.

17, St. Helen's Place,
London, 10th January, 1917.

The Secretary,
British South Africa Co.,
2, London Wall Buildings, E.C.

Dear Sir,

RHODESIAN BEEF.

We now have pleasure in enclosing account sales for 88 qrs. of frozen beef per "Kenilworth Castle," and we hope the result will be satisfactory.

The beef was marketed and sold off the hooks at Smithfield. Although some of the quarters were rather better than others, there was no marked difference in quality, and, having regard to the present position of the market, the consignment

was all sold at the one price. The beef was landed in good hard frozen condition, and had been carried from South Africa satisfactorily. Just here and there some of the flanks appeared to have been soft at some time, but this defect was so slight that it had no bearing whatever on the sale of the meat.

5 *Aberdeen Angus bred by Mr. Woods.*—This beef was of prime quality, but sufficient care had not been taken in the dressing. The beef had been quartered hot, which gave it a rather unsightly appearance, the forequarters particularly shewing up unfavourably. The result of this insufficient cooling in the hindquarters resulted in a certain amount of animal heat being left in some of the quarters, and these on being bored were found to be rather badly bone tainted. It will be seen, therefore, how essential it is for shippers to see that beef is thoroughly cooled before dressing. The weights were satisfactory and suitable for the London trade. The quarters were well covered with fat, compact and fleshy. We noticed the aitches had been sawn through instead of chopped; the latter is the best method; the former system tends to give the animal an aged appearance.

Red Lincolns bred by Mr. Hull.—This beef was all of prime quality, but badly dressed, and had practically the same faults as Mr. Woods'. As a parcel the beef was a little too heavy for the usual London trade, but with the present shortage in all classes of frozen beef, this did not affect the selling value. The quarters were rather large framed, but well covered, and carried plenty of flesh in proportion to bone. It is to be regretted that, owing to the beef not being thoroughly cooled, a rather large amount of hindquarter meat was condemned for bone taint, and this affected principally the prime cuts. The aitches had also been sawn instead of chopped through.

5 *Herefords bred by Mr. Granger.*—Although this beef was of good quality, it did not shew up so well from buyers' point of view as the two previous lots. The same faults were noticeable, *i.e.*, rather bad dressing and quartering hot; but fortunately none of the meat was taken for bone taint. The "tops" of the hinds were fairly thick and shapely, but in many cases the loins were rather poor and short of flesh. The aitches had all been sawn. The forequarters did not present

a very good appearance on account of the dressing, the meat in some cases have receded slightly from the bone.

On the whole, the shipment was considered satisfactory, and much superior as regards quality to the general run of beef from South Africa. The dressing was the particular fault, and it is very essential that this should be done carefully. It can be easily understood that the good appearance and get up of a quarter in a rather dull trade will help its sale considerably, whilst good quality beef is often spoiled by careless dressing. Provided the few defects we have pointed out are remedied, we see no reason why beef such as shipped in the "Kenilworth Castle" should not meet with a ready sale at satisfactory prices.

Yours faithfully,

(Sgd.) J. McLachlan,
W. Weddel & Company, Ltd.

Copy.

ACCOUNT SALES of 44 Fores and 44 Hinds Frozen Beef, *ex* "Kenilworth Castle."

Arrived London, 22/11/16, from Durban; sold by order and for account of

The Imperial Cold Storage & Supply Co., Ltd.,

By W. Weddel & Co., Limited, 17, St. Helen's Place, London, E.C.

Mark R.C.S. & B.S.A.

			£ s. d.	£ s. d.
		ABERDEEN ANGUS.—HINDS.		
Dec.	18	7 qrs. 1,523 lbs. *ex* store, at 9⅜d. per lb.	59 9 10	
	18	3 ,, 142 ,, ,, ,, 7d. ,,	4 2 10	
		517 ,, (condemned, bone taint)		
		10 2,182		63 12 8
		ABERDEEN ANGUS.—FORES.		
	18	10 qrs. 2,224 lbs. *ex* store, at 7½d. per lb.		69 10 0
		HEREFORDS.—HINDS.		
	18	10 qrs. 2,029 lbs. *ex* store, at 9⅜d. per lb.		79 5 2
		HEREFORDS.—FORES.		
	18	10 qrs. 2,137 lbs. *ex* store, at 7½d. per lb.		66 15 7
		RED LINCOLN.—HINDS.		
	18	17 qrs. 3,977 lbs. *ex* store, at 9⅜d. per lb.	155 7 0	
		7 ,, 532 ,, ,, ,, 7d. ,,	15 10 4	
		1,199 ,, (condemned, bone taint)		
		24 5,708		170 17 4
		RED LINCOLN.—FORES.		
	18	24 qrs. 5,543 lbs. *ex* store, at 7½d. per lb.		173 4 4
				623 5 1
		OUT-TURN OF WEIGHTS.		
		44 Fores } Frozen Beef		
		44 Hinds } *ex* "Kenilworth Castle."		
		Gross Store Wt. 19,999 lbs.,		
		Shipping Wt. 19,702 lbs.		
		2 lbs. per qr. allce. 176 lbs.		
		A/c Sales Wt. 19,823 lbs.		
		CHARGES.		
		Port Rate	0 14 9	
		Aerial Risk	0 11 8	
		Landing, Storing, Weighing and Delivery	15 7 7	
		Commission and Guarantee, 2%	12 9 4	
				29 3 4
		Nett proceeds due 15/12/16		£594 1 9

E. & O.E., London, 3/1/17.

STATEMENT OF THE RESULT OF THE CONSIGNMENT OF 88 QUARTERS OF RHODESIAN MEAT.

By the R.M.S. "Kenilworth Castle."

By Sales—						
18,107 lbs. as per account sales (average 8.26d. per lb.)				£623	5	1
To Charges—						
Costs of shipment as per Bulawayo Office statement	£538	16	10			
London charges as per account sales	29	3	4			
Sundry expenses London Office	1	1	3			
				569	1	5
Balance, being net profit				£54	3	8

REPORT BY MR. R. WALSH.

"This consignment consisted of twelve carcases of cross-bred Lincoln Reds, averaging 937½ lbs., bred and fed by E. A. Hull; five carcases of cross-bred Aberdeen Angus, averaging 881 lbs., bred and fed by F. E. Woods; and five carcases of cross-bred Herefords, averaging 833 lbs., bred and fed by R. Granger.

"It was generally conceded that the Aberdeen Angus carcases were the best, as they were just the weight required for the London market. The Lincoln Reds were of equally good quality, but were too heavy for the trade in ordinary times. The Herefords were not quite fat enough, but owing to the scarcity of meat on the market, it all sold for the same price, namely, 9½d. per lb. for hindquarters and 7½d. per lb. for fores. There was fault found with the manner in which it was butchered and prepared. This fault is found with all beef from South Africa, and must be remedied. The Trades Commissioner of South Africa has repeatedly pointed out this defect, and is urging exporters to be more particular and have this beef prepared in accordance with Smithfield requirements.

When properly prepared, it will add at least ½d. per lb. to the selling price. In spite of this defect, the prices realised covered all expenses, with a fair margin over Johannesburg cost. The cost of slaughtering, freezing, freight and marketing works out at about 25 per cent. of the cost of the animals on the Johannesburg market.

"Nobody expected to see such heavy carcases coming from Rhodesia, as there seemed to be an idea that it was a country only capable of producing small cattle. Many of the men engaged in the meat trade recalled the arrival of the first consignment of beef from the Argentine thirty years ago, and said that this first consignment of Rhodesian meat was infinitely superior. The shipment from the Argentine in 1885 of frozen beef amounted to only £343, while in 1915 the total export had swollen to £15,552,416. There is no doubt of Rhodesia becoming a great meat-producing and exporting country. Particular care should be taken that only the best beef is sent from Rhodesia to Smithfield, in order to establish and maintain a good reputation. Messrs. Hull, Woods and Granger are to be congratulated on the quality of their beef, and they would have been proud if they had heard the flattering comments made on it in Smithfield."

An Investigation of the Oxidation of Cattle Dips when Bottled.

By A. W. Facer, Acting Assistant Agricultural Chemist.

It has long been known that the sodium arsenite of cattle dip has a tendency in the tank to pass by oxidation into the much less effective tick-killer sodium arsenate, and that, curiously enough, this conversion sometimes ensues much more rapidly when the dip is enclosed in a corked bottle with only a limited supply of oxygen. It has been thought that a dip, which takes several days in transport from the farm to the laboratory, may undergo oxidation and consequent deterioration to such an extent that the Government analysis of the contents of the bottle may not be safely accepted as that of the tank solution.

The investigations of Mr. Holborow, Assistant Agricultural Chemist, have led to the discovery of a simple method of completely arresting this oxidation, *i.e.*, by the addition of sufficient sulphuric or hydrochloric acid to make the dip in the bottle faintly acid in re-action. Two questions then naturally arise:—

(1) What is the period which must elapse before oxidation has proceeded to such an extent as to involve *serious* error, unless the "preservative" (acid) is applied?

(2) Is the "preservative" always efficacious?

It was to attempt to answer these questions that the following investigations were conducted.

Procedure.—By the courtesy of Mr. Sinclair (Chief Veterinary Surgeon) two sample bottles from each of six

dipping tanks were forwarded to the laboratory so that they could be analysed on the day they were taken (4th January, 1917).

One bottle from each tank was then treated with acid, 2 c.c.'s of concentrated sulphuric acid being added to each, which was found to produce marked acidity in all the solutions. One bottle from each tank was not treated in any way. Samples from the acidified and unacidified bottles were analysed from time to time, over periods extending from 4th January to 22nd February, 1917. In all, 84 analyses were performed. It would be tedious, and of no practical purpose, to state all the details of these. Instead of this, the chief results have been expressed in percentages, so that they may be readily and clearly understood.

Dip NOT treated with Preservative.—The analyses conducted on the day that the samples were taken revealed some interesting facts. It has been thought that, other things being equal, a dipping solution which had been in the tank for a long period would probably be more highly oxidised than one which had been used for a shorter period. The analyses failed to verify this supposition. A sample of solution twelve months "old," *i.e.*, since last cleansing and mixing, and a sample twenty months old shewed no traces of oxidation, whereas of two samples six months old, one was oxidised 12 per cent., and the other 20 per cent.

Another interesting feature was that dips which were already partly oxidised in the tank underwent rapid oxidation in the bottle, whereas dips which were not oxidised in the tank changed much more slowly in the bottle. The following results, obtained from some of the samples, will demonstrate this:—

Solution.	Original Oxidation.	Increase of Oxidation after 3 days.	7 days.	11 days.	19 days.	49 days.
1	8%	7%	14.2%	31.4%	36.5%	45%
2	0	0	0	0	0	23%
3	0	0	0	0	0	0

As a side-light on the "acid preservative" theory, it is

interesting to note that solutions Nos. 2 and 3 in the above table were not so alkaline in re-action as No. 1; in fact, No. 2 was slightly acid to litmus.

Some solutions shewed a tendency to "revert"; oxidation proceeded for a few days, then a reverse change from arsenate to arsenite appeared to take place, to be finally followed by much increased oxidation; thus a sample which had oxidised from 0 per cent. to 6 per cent. in three days, shewed only 2 per cent. of oxidation on the 11th day, which increased to 77 per cent. after 49 days. It is possible that these variations may be due to lack of homogeneity in the solutions, which, it should be remembered, always contain much solid matter, before being filtered for analysis.

From what has been said, it will appear that there was considerable difference in the behaviour of the dips, some oxidising very slowly, others fairly rapidly. The aim of the investigation was to discover the oxidation which might be expected in the average sample in transport from the tank to the laboratory. The average deduced from the six samples taken is given in the following table:—

Increase in Oxidation after				
3 days.	7 days.	11 days.	19 days.	49 days.
4.7 %	11.2 %	15 %	23.5 %	50.9 %

When oxidation takes place, the sodium arsenate has a tick-killing power of about one-half of that of the arsenite from which it is formed. Hence the deterioration in tick-killing power, represented by the above figures, is given by the following table:—

Decrease in Tick-killing Power after				
3 days.	7 days.	11 days.	19 days.	49 days.
2.3 %	5.6 %	7.5 %	11.7 %	25.4 %

From this it will be seen that a sample of dip which takes one week to reach the laboratory loses on the average 5.6 per cent. of its tick-killing power, *e.g.*, instead of being reported as "Cooper's" 1 in 200, or "Arsenoda" 1 in 400, it would be reported as 1 in 211 and 1 in 422 respectively. This cannot be regarded as an error liable to have dangerous consequences for stock, so that it would not appear necessary to add

a preservative, unless the transport of the dip is to occupy more than a week. At the same time, it should be pointed out that the sample which shewed the greatest tendency to oxidation deteriorated by 20 per cent. in seven days.

It is possible that the oxidations recorded above may be greater than those taking place in a bottle during transport for equal periods, for the following reason. During transport a bottled dip is in contact with a small and limited quantity of air, whereas, in the above experiments, the air supply was increased and renewed each time a portion was withdrawn for analysis. Towards the end of the series the bottles contained very little dip, and a very large quantity of air.

Dips treated with Preservative.—It was found that the 2 c.c.'s of sulphuric acid added to each bottle completely arrested oxidation in all cases. The average deterioration due to oxidation after 49 days was only .8 per cent.

In conclusion, it may be said that, since the results obtained are the average of only six samples, they are not put forward as being absolutely representative. They are intended to re-assure farmers who have exhibited concern about oxidation, and to act as an approximate practical guide to farmers in remote districts.

The Turnip Sawfly.

(*ATHALIA FLACCA*, KONOW.)*

By R. W. Jack, F.E.S., Government Entomologist.

The insect which forms the subject of the present paper was first recorded as a pest of turnip, kale, rape, cabbage and allied plants in the *Rhodesia Agricultural Journal* for April, 1910, a second note appearing in the number for the same month of the following year. Sufficient time has elapsed since to shew that this little pest, although its attack varies in intensity from year to year, is always liable to destroy in a most complete manner plantings of its food plants of moderate extent, and may cause considerable defoliation over larger areas. It is one of the pests which combine to render the extensive cultivation of cruciferous crops in this Territory for the present an extremely speculative undertaking.

Description, Habits and Life History.—The appearance of the adult insect may be seen by reference to Plate I., Fig. 1. The larger females measure up to three-quarters of an inch across the expanded wings, with a body length of three-tenths of an inch. The males are usually rather smaller. The head and thorax are black, and the abdomen light yellow. The tips of the wings are smoky. These adults may be seen flying about and settling on the leaves of the food plants in the bright sunshine. They are much less active in cool, cloudy weather.

* Owing to an unexplained error, the name of this insect was originally supplied from the British Museum as *Athalia rosæ*, Linn., and reference has been made to it under this name. During the writer's visit to England in 1915, however, specimens were compared with *A. rosæ*, and found to bear but a very superficial resemblance to that species. With the help of Dr. Guy Marshall, Director of the Imperial Bureau of Entomology, the species was determined as above from Konow's illustration. No specimens beyond those supplied by the writer were present in the Museum collection.

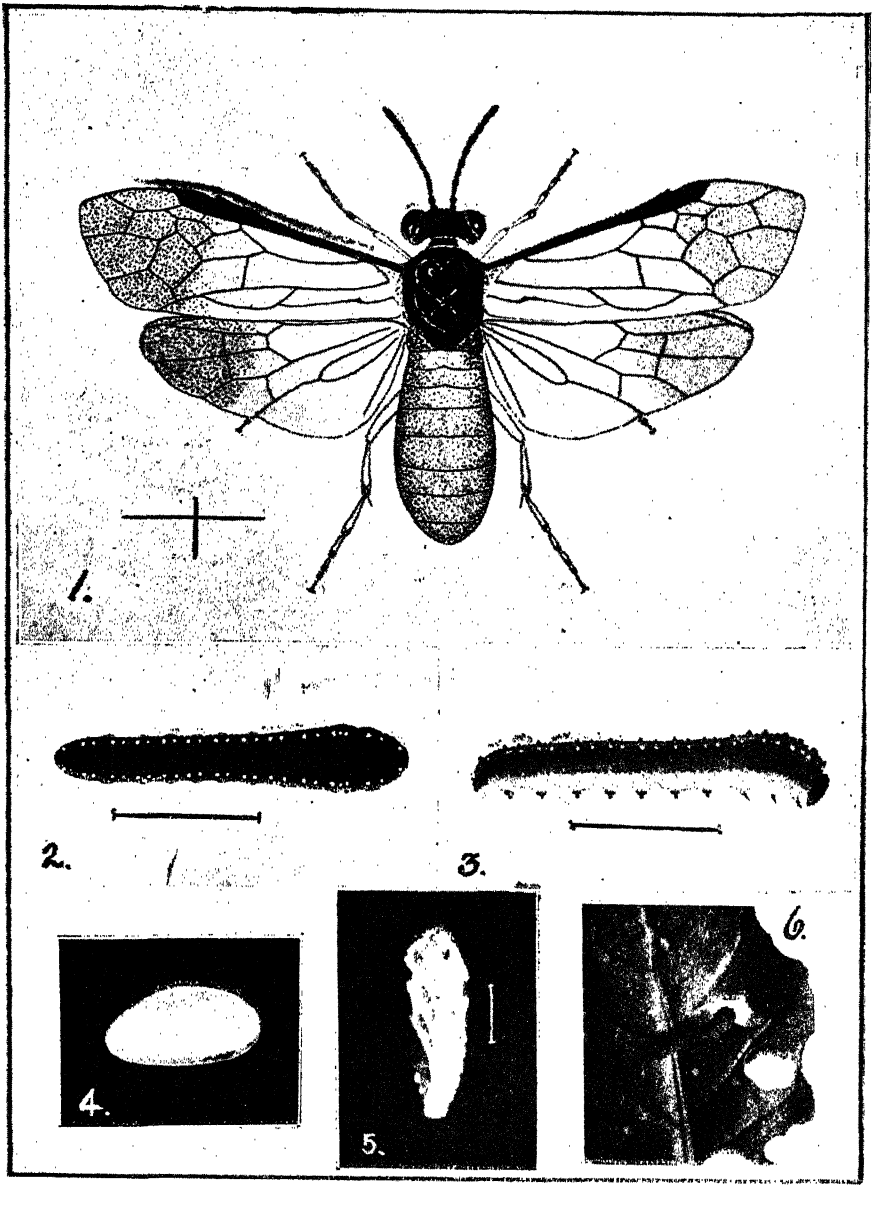


Plate I.

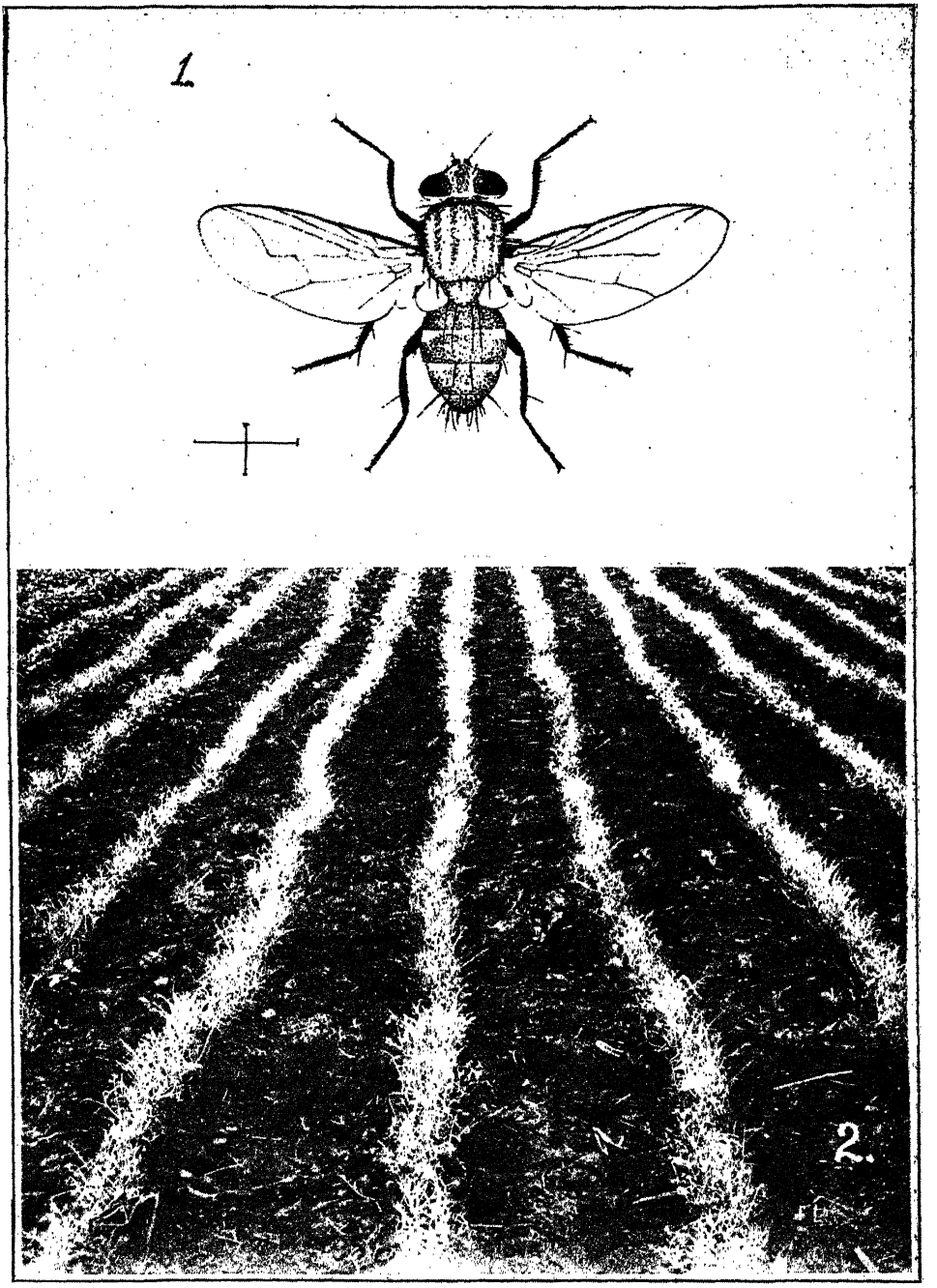


Plate II.

Like other sawflies, the female is provided with a complicated ovipositor for inserting her eggs into the tissues of the food plant of the grub. In the present species this is carried out at the edges of the leaves. When the eggs are laid in the seed-leaves of newly sprouted plants, as is often the case, the position of the egg is shewn by a blister visible on under surface of the seed-leaf. The position is all the more clearly marked, as the growth of the leaf soon forms an indentation in the outline at the point of oviposition. The punctures are very difficult to locate in the older leaves. The egg itself is white, smooth and shiny, measuring .9—.95 mm. x .47—.49 mm., and is of the form shewn at Plate I., Fig. 4. It hatches in about six days.

The newly hatched grubs are green in colour, with the fore part of the body swollen, giving them a characteristic appearance. They commence to feed at once on the under surface of the leaves. Growth is rapid, the whole feeding period of the grub occupying about seventeen days in the summer months. This may be extended to at least twenty-six days in April and May. It is during the last few days of growth that the bulk of the damage is done to the crop. The full grown grub measures nearly three-quarters of an inch in length. The back is dark green in colour, with two rows of yellow dots. The under part of the body is pale green or yellowish. The swelling of the fore part of the body, although noticeable, is not so marked as in the younger forms. Illustrations of the mature grub from above and from the side are shewn on Plate I. at Figs. 2 and 3. These grubs may be distinguished from caterpillars, to which they bear no small resemblance, by the presence of eight pairs of false legs or abdominal feet; caterpillars never possessing more than five pairs.

On completing its growth, the grub enters the soil, where, within an inch or so of the surface, it constructs a tough cocoon, obscured by adherent particles of soil. It is of interest to note that the grubs appear invariably to moult their skins just before entering the soil. A cocoon was found to measure about two-fifths of an inch in length by slightly under one-fifth of an inch wide. These cocoons are extraordinarily hard to find in the soil, as the adherent particles give them the appearance of pellets of earth. The grub does

not immediately change to a pupa, but remains in the cocoon as a resting larva for at least ten days, and probably much longer in the winter. An enlarged photograph of the pupa is shewn at Plate I., Fig. 5. The shortest period recorded between the entrance of the grub into the soil and the emergence of the adult sawfly is twenty days (January). The longest is one hundred and sixty days (May—November).

The longevity of the adults does not appear to be very great. Adults have been observed abundantly the first week in January, and have gradually decreased till none at all were about the plants during the third week. In captivity, however, an isolated male lived for twenty-eight days, being fed on honey in the meantime.

The whole life cycle from the insertion of the egg into the leaf to the emergence of the adults may be passed in as little as forty-three days in the summer. During the winter the period is very variable, as may be seen from the following:—From a large number of eggs deposited between 11th and 18th April, the bulk of the larvæ entered the soil about 23rd May, and practically all had done so by 27th May. Adults emerged from this batch from 18th July to 8th November.

From the results of various breeding tests, it appears that the pest matures about four complete broods during the year. Eggs laid the first week in January produce adults the third week in February. Eggs from these mature the first and second week in April. The next brood is apparently very irregular, the bulk of the adults emerging during the latter part of the winter and early spring. These doubtless give rise to the early January brood. The broods, however, overlap greatly, and are not distinct. For instance, a destructive brood is very common in early February, and this must have been produced by eggs laid in December.

The emergence in mid-winter in this climate of insects requiring herbaceous foliage for their larvæ has always seemed to the writer difficult to understand, as such foliage is exceedingly scarce at that season, being in fact confined to naturally moist situations, which are, as every Rhodesian knows, most unfortunately scarce. Nevertheless, the habit is common to the bulk of our injurious leaf-eating caterpillars.

The sawflies emerging as above did not exhibit any tendency to longevity, as might have been expected if they were to live over until the rains furnished suitable foliage in which to deposit eggs. All failed to lay, and died within a few days of their emergence.

Seasonal Prevalence.—The Turnip Sawfly occurs as a pest mainly during the months of January and February, but may be fairly abundant in March. It may be observed that, although the adult sawflies may emerge during the dry season, this insect has never been recorded as injurious to crops grown under irrigation. This is in sharp contrast with the tendencies of moths of similar life history, such as the Pigweed Caterpillar (*Laphygma exigua*, Hbn.), our native cutworms, the Cabbage Webworm (*Hellula undalis*, Fab.), the Diamond Back Moth (*Plutella maculipennis*, Curtis) and several others, which are great pests of dry season crops. All observations tend to shew, in fact, that dry weather is to a large extent inimical to the increase of sawfly, and that the wetter the season the more danger there is of a heavy outbreak.

In order to gain perspective with regard to the importance of the present pest, the following sequence of insect attack on cruciferous plants should be noted:—Before the rains Diamond Back Moth and Cabbage Webworm are very destructive; during the height of the rains Turnip Sawfly and the Green Striped Webworm (*Crocidolomia binotalis*, Z.) are the chief pests, the latter being, however, sporadic; towards the end of the rains and in the early winter Cabbage Aphis (*Aphis brassicæ*, Linn.), Bagrada Bug (*Bagrada hilaris*, Burm.) and Cabbage Webworm may be confidently expected, and their combined attack commonly removes the last vestige of interest the experimenting farmer may have had in his crop.

Damage.—The chief damage is done as a rule during January and early February, when the plants attacked are small. In small patches this attack is frequently of an overwhelming nature, the crop being entirely stripped of its foliage beyond the hope of recovery. This has frequently happened at the agricultural laboratories at Salisbury, when cruciferous crops have been under test in the plots. Beneath the attack of the present and other pests, crucifers have

almost invariably failed to yield satisfactorily as a summer crop, in spite of the fact that they make excellent growth. Such crops can at present, therefore, only be grown with reasonable safety under market garden conditions, where the plants can receive the attention necessary to protect them from insect pests. Their cultivation as field crops is not recommended.

Food Plants.—The pest attacks all cultivated plants of the cabbage family. Its native food plants are unknown.

Natural Enemies.—As the insect certainly becomes less abundant as the wet season progresses, in spite of continued abundance of food, it would appear that it must be checked to some extent by natural enemies. From grubs collected in the field, however, only one species of parasite has been bred, and this only from those collected in the winter (May). This is a species of fly belonging to the parasitic family *Tachinidæ* (see Plate II., Fig. 1). The flies emerged at the end of July. No other observations have been made concerning natural enemies.

Distribution.—The pest is native to Africa, and has been recorded from many widely separate parts of both Matabeleland and Mashonaland, and no doubt it occurs throughout the Territory. It appears not to be injurious in the South Africa Union, although there is reason to believe the species occurs there.

Control.—When the grubs are nearing full growth, which is the time when the damage is usually noticed, they are surprisingly difficult to destroy with the arsenical compounds generally used against leaf-eating insects. The best method of protecting the plants is to keep a lookout for the adult sawflies, and if these are at all abundant, to spray weekly with arsenate of lead 1 lb.—16 gallons, endeavouring to get as much liquid as possible on the undersides of the leaves, as it is there that the newly hatched grubs commence feeding.

With respect to the resistance of the larger grubs to arsenical sprays, it may be stated that experiments have been carried out practically every year since this pest was first noticed, and the unavoidable conclusion has been reached that arsenate of lead is ineffective against the large grubs at any

reasonable strength, and that, in order to kill, the arsenites have to be used so strong that they are injurious to the plants. The only really successful application made was arsenite of lime, consisting of 1 lb. of arsenite of soda (80 per cent.) and an equivalent quantity of lime to 100 gallons of water, a "sticker" of resin being included. This is too strong a spray to apply to these crops. This result is all the more surprising as, in other countries, sawfly grubs of different species are stated to yield very readily to arsenical sprays.

Fortunately we have an alternative to stomach poisons in paraffin emulsion. This preparation, made according to the formula given in the appendix, will kill all the grubs it hits, and if clean cultivation is practised, there is no reason why a young crop should not be practically rid of the pest by one thorough spraying. The liquid is best applied through a fan-shaped nozzle of the Bordeaux type, so that the spray strikes the insects with some force. A knapsack pump is the most convenient for applying the spray. On commencing to spray a plant, the bulk of the grubs fall, so that the ground beneath must receive a good spraying in addition to the plant. This treatment is not so effective on large cabbages, owing to the cover afforded by the leaves, but as the insect is chiefly injurious to the plants when only a few small leaves are present, this is not of great moment.

On clean level pieces of ground much good can be done by sending natives along the rows to disturb the plants so that the grubs fall to the ground. They should be armed with something with which to crush the grubs—a piece of plank about six inches long by two inches broad answers very well.

SUMMARY.—The Turnip Sawfly is a small winged insect with a black thorax and yellow body measuring up to three-quarters of an inch across the expanded wings; it lays its eggs in slits made in the edge of the leaves of plants of the cabbage family; the grubs are green and much resemble caterpillars; they are chiefly injurious in January and February; if the parent flies are seen abundantly about the plants, crops may be protected by spraying weekly with lead arsenate 1 lb.—16 gallons of water; young crops may be rid of the pest by thorough spraying with paraffin emulsion, prepared as directed in the appendix.

EXPLANATION OF PLATES.

Plate I. Fig. 1. Turnip Sawfly adult greatly enlarged. Actual dimensions indicated by crossed hair lines adjacent to figure.

2. Full-grown larva or grub, viewed from above, multiplied by about 2½ diameters. Actual length indicated below figure.

3. Full-grown larva viewed from the side.

4. Egg—greatly magnified.

5. Pupa enlarged. Actual length indicated by hair line adjacent to figure.

6. Sawfly grub, natural size, on turnip leaf.

Plate II. Fig. 1. Tachinid fly, parasitic on grubs of Turnip Sawfly—greatly enlarged.

2. Field of turnips injured by Sawfly. (Agricultural Laboratory, Salisbury.)

APPENDIX.

Paraffin Emulsion.

Soap, 1 lb.
Paraffin oil, 4 gallons (1 tin).
Water to 60 gallons.

Cut up soap and boil until dissolved in two gallons of water. Remove from fire and immediately add to the oil. Churn violently; fully five minutes if with a pump, or ten to fifteen if with a paddle. This constitutes the concentrated solution. Should keep without separating in concentrated condition; and when made as directed one part of concentrated emulsion to nine of water gives the proper dilution.

Immunity

IN ITS RELATION TO THE STOCK DISEASES OF SOUTHERN RHODESIA.

By L. E. W. Bevan, M.R.C.V.S.,
Government Veterinary Bacteriologist, Southern Rhodesia.

PART III.

There remains to be considered from the point of view of immunity, a group of diseases caused by the protozoa, minute unicellular organisms belonging to the animal kingdom. This group is of considerable importance, including, as it does, many of the most serious diseases affecting animals in this country.

The manner in which parasites give rise to disease has already been explained, but it may be well to recapitulate. The parasitic protozoa maintain their existence at the expense of some other living being known as the "host," nourishing themselves upon it sometimes by obtaining from it nutritious substances rejected by it, or by intercepting the food necessary for its sustenance, and sometimes by actually feeding upon its body substances or vital fluids. In addition to robbing the host of nourishment, the protozoa, by their actual presence, may set up mechanical injury or may generate toxic substances poisonous to the animal in which they are produced. The power to produce disease possessed by different parasites varies; some of them set up a transitory illness from which the affected animal easily recovers by overcoming and eliminating the parasite. Others may set up a disease from which the animal recovers without eliminating the parasite, which continues to exist in it in a state of harmony, the host becoming tolerant to the effects of the parasite and capable hence-

forth of keeping it supplied with the nutriment it requires, without suffering in health or vigour, until some adverse condition upsets the balance, so that the harmful effects of the parasite again predominate. Such a state of affairs is obviously favourable to the parasite, enabling it to maintain its existence indefinitely, the death of the host being a disaster terminating the existence of both of them. Some protozoa, comparatively harmless in one species, may, when transferred to another, increase in virulence and become capable of causing death with greater or less rapidity.

In the propagation of a disease, the life cycle of the parasite plays an important part. A parasitic protozoon may reproduce itself by simple multiplication, merely with the object of establishing itself in its host; or, in addition, may give off what are known as "propagative phases," which do not multiply further in the host, but await their chance of being transferred to a new host when opportunity arises. The manner in which this transference takes place varies, but in the majority of cases which have to be considered in connection with local diseases the protozoa parasitic in the blood of vertebrates are disseminated by blood-sucking invertebrates, such as ticks or insects, which take up the parasites by sucking the blood of an infected animal. Later on the parasite may be inoculated into a second host by the invertebrate when it sucks blood at a later feed. In some cases the transference of the blood parasite may be effected in a purely direct and mechanical manner, but in most cases the invertebrate plays the part of a true host, in which the parasite multiplies and goes through a cycle of development.

It is unfortunate that many of the methods employed to convey artificially "active" or "passive" immunity against bacterial diseases are not equally effective against those caused by animal parasites. Nevertheless, immunity, both natural and acquired, plays an important part in connection with many of the protozoal diseases affecting stock in this country, the more important of which will now be considered.

The *Plasmoses* of cattle include two diseases of the greatest economic importance in Rhodesia, namely, the so-called redwater and gall-sickness, which are caused by minute animal parasites inhabiting the red blood cells of infected animals. If the blood of an animal suffering from redwater

is examined under the microscope, certain minute pear-shaped bodies may be seen, often in pairs, and therefore named *Piroplasma bigeminum*, which are the causal parasites of the disease, and bring about the breaking down, or solution, of the red cell. The red colouring matter of the cell passes into the urine, and gives it the characteristic colour from which the disease "redwater" obtains its name. In other cases the products of the broken-down cells become filtered off by the liver, which becomes super-charged with this material in the form of bile; this makes its way into the circulation, and the condition known as jaundice is set up. In either case the destruction of the red cells is considerable, and often three-fourths of the total number of them are destroyed in this manner.

If the animal survives this attack, there is an interval of a week, or perhaps two weeks, during which it appears to have completely recovered; but somewhere about the twenty-fifth to the thirtieth day its temperature once again commences to rise, and a second illness sets in, with symptoms very like the first, except that the red urine is seldom passed. The most pronounced symptoms are those of jaundice, and hence the common name "gall-sickness" is used to describe this disease; but in other cases the red cells become broken down, and the only symptoms are those of intense anæmia. This may be explained by the microscopic examination of the blood, when it is seen that the red cells are again invaded by another foreign body, a small, deeply staining particle, most often situated at the margin of the cell. When stained with certain dyes, it resembles the nucleus of the redwater parasite, but has no body substance. Theiler regards it as a parasite distinct from the redwater parasite, and has given it the name *Anaplasm*, that is, without plasma, and the disease is now called *Anaplasmosis*.

The acute forms of these diseases are known to laymen as redwater and gall-sickness, because of the characteristic clinical features presented; but there is no common name to describe the sub-acute or chronic forms of the disease characterised only by anæmia and general loss of condition and growth, so that their real nature is seldom recognised.

In 1909 Nuttall and Hadwen described experiments shewing that trypan-blue exerted a specific effect upon the parasite of redwater, causing it to degenerate rapidly and to disappear

from the blood, after which the fever and hæmoglobinura ceased and the animal recovered from the other clinical manifestations of the disease. Such treated animals continue to harbour the parasites in their blood for years, as can be shewn by the inoculation of their blood into clean animals. This drug does not exert a similar effect upon the second re-action or *Anaplasmosis*, which does not respond to any known form of treatment.

In animals which recover from redwater and gall-sickness, both parasites persist in the blood for a considerable number of years without causing any apparent harm, a state of tolerance having been established between host and parasite. From such animals the parasites may be taken up by the blue tick, passing through her many thousands of eggs to the larval or "seed" ticks hatching from them, each of such larvæ being capable of transmitting the progeny of such parasites to susceptible animals upon which it feeds. In this way wherever salted cattle and blue ticks exist these diseases become enzootic. The severity of the infection varies according to the susceptibility of the host. Young animals during the first few months of life exhibit a marked resistance to the disease. Indigenous breeds possess a considerable degree of immunity, but if mated with imported animals their crosses are more susceptible. Animals imported from Great Britain and other countries where these diseases do not exist are highly susceptible, and if naturally infected suffer most severely and generally succumb; but even among these the susceptibility varies, young cattle under the age of fifteen months and of hardy types offering greater resistance than older, finely bred, fat and pampered animals.

The losses due to these diseases in this country are enormous. In young indigenous cattle, while setting up no acute disease, these parasites give rise to an anæmia which seriously interferes with development and growth, and to a large extent accounts for the small size of our local stock. In addition to the loss of growth, they set up a lowered vitality, especially among grade animals, which readily become the victims of other minor ailments, in some herds the losses among better bred young stock amounting to anything from 25 to 75 per cent. Lastly, there is the loss of imported stock. Our indigenous cattle are quite useful foundation stock, but are

notably small and slow to mature, and great improvement by the infusion of imported blood is necessary to give larger size and earlier maturity; but under existing conditions the importation of stock into this country from overseas is a proceeding fraught with considerable danger.

The more general application of the principle of "short-interval dipping" has to a large extent reduced the losses due to the tick-borne diseases, and at the present time there are farms to which imported cattle for the improvement of local herds can be introduced with comparative safety, and upon which improved progeny grow up free from infection. The advantages thus derived are enormous, but it must be remembered that the dipped areas in this country are far exceeded by those where the principle is not carried out, and where ticks and the diseases transmitted by them are still prevalent. Thus in practice there would appear to be three stages in the development of a herd: the first or "pioneer" stage, when a man takes up "raw" veld, and runs upon it a nucleus of native cattle, which he endeavours to improve at considerable risk by the introduction of imported or better bred stock; a second stage, when by systematic dipping the veld becomes tick-free, and imported stock can be introduced with impunity, and the progeny grow up and thrive free from disease; and, lastly, a stage when animals bred upon such areas, being susceptible to tick-borne diseases, cannot be exposed upon tick-infested veld, so that their usefulness and market value is considerably reduced. Therefore, in spite of the advantages of systematic dipping, there are certain disadvantages associated with it, until the principle becomes universally practised. In the meantime, there remains the necessity for a satisfactory method of inoculation for the protection of imported bulls exposed upon infected veld, and of young stock born upon tick-free farms, in order that they may be disposed of with safety beyond the limits of such areas. During the past ten years efforts have been made to discover a satisfactory means of conveying immunity, but experiments have unfortunately been handicapped by the extreme cost of experimental animals, which have, of necessity, to be imported from countries free from these diseases.

That natural resistance or immunity does exist and acquired immunity can be set up against these diseases has

been shewn, but it has not been found possible to determine the nature of it, or to recover those elements or "immune bodies" upon which it depends, or to make use of them to set up an active or passive immunity by artificial means.

Advantage has had to be taken of the practical observation that the virulence of the parasites becomes reduced by passage through indigenous stock, a fact which has been borne out by laboratory tests. In this way a vaccine-virus has been obtained giving rise to mild re-actions in suitable animals, which on recovery become tolerant or immune to natural infection. From time to time during the past ten years consignments of cattle have been imported by progressive breeders anxious to improve the class of cattle in this country, and the Veterinary Department has been called upon to inoculate them. The mortality of untreated animals naturally infected was known to be so high that the application of any method which would confer immunity at a lower death rate was justified. In 1911 ninety-four bulls were imported and inoculated, some with a virus supplied from the Veterinary Research Laboratory, Pretoria, others with blood obtained locally from cattle on a farm where a very mild strain of virulence was known to exist. Among the latter a death rate of 5 per cent. occurred; and, though none of the animals inoculated with the Pretoria virus died at the time of inoculation, a great number of them contracted and died from the disease when exposed to natural infection. Those inoculated with the local strain of virus, although they suffered more severely at the time of treatment, subsequently proved immune.

Again, in 1912, about sixty-eight animals were imported from overseas and were presented for inoculation. Twenty-five home-bred animals died, but it should be pointed out that their owners had been previously warned that many of these animals were unsuitable for inoculation on account of age, soft condition, pregnancy or in-breeding; and the inoculation was undertaken under protest.

In 1913 ninety-four cattle from Great Britain were inoculated, with a loss of twenty-seven. This mortality was probably due to some unaccountable exaltation in the strength of the virus used, and it was thought wise to suspend further inoculation until the process could be placed upon a safer

basis. With this object two consignments of cattle from Great Britain were obtained during the past three years, and various strains of virus have been tested upon them, but during this time no privately-owned animals have been accepted for inoculation until October last, when thirteen animals were treated, with a loss of two. It is now confidently believed that, given suitable accommodation, young animals not exceeding fifteen months, hardy and not too finely bred, fed or pampered, can be inoculated with safety; and that locally-bred young stock can now be inoculated when "at heel" with a mild virus, causing little or no ill effect, but rendering them immune when subsequently exposed to natural infection.

It is admitted that the inoculation of stock as hitherto carried out has been upon an empiric basis, the experiments necessary for the standardising of the virus being too few and the accommodation for the cattle under treatment unsatisfactory. Nevertheless the condemnation of the process of inoculation has not been entirely justified, as figures and statements supplied by the owners of some of the treated animals will shew.

It is true that inoculated animals suffer more or less severely during their re-actions, and that their health is impaired for some weeks, and, in the case of unsuitable animals, sometimes for months. Such animals when distributed have to acclimatise and accustom themselves to strange feeding and treatment. The ignorance exhibited by their owners is sometimes stupendous, and it is such men who are generally loudest in condemning the inoculation. It is not surprising that the first crop of calves obtained from some of the inoculated bulls is disappointing, but in the great majority of cases the second or third crop is quite satisfactory, and the improvement is marked year by year. The inoculation of female stock is also handicapped by the possibility of the animals being "in calf," in which case abortion may occur, or the calf may die *in utero* and be retained so that the cow remains barren.

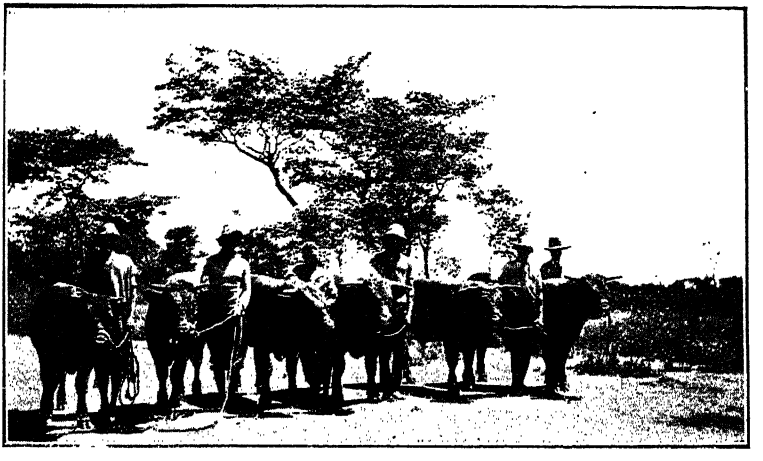
The indigenous cattle of this country, being resistant to disease, hardy and prolific, afford a useful nucleus from which to build up our herds, but they are small and slow to mature, and in ordinary times and conditions unsuitable for the meat markets of the world. It is true that already cattle are being exported in large numbers from Matabeleland to the Union,

and a small consignment of selected beef has been placed as a sample upon the Smithfield market; but it must be remembered that a great all-round improvement must be brought about if a supply of equal value is to be maintained. This can only be accomplished by grading up by the infusion of better blood, which must of necessity be imported.

The introduction of imported stud animals can be safely accomplished on a few farms where short-interval dipping has been systematically practised for some time, but it must be remembered that such areas are greatly exceeded by tick-infested veld, upon which the majority of imported stock would die if not previously rendered immune. Thus the successful inoculation of imported stock becomes an important factor in the progress of the pastoral industry; and it may be well to again emphasise the statement that it is confidently believed that, given suitable accommodation for the housing of animals under treatment, it can be safely undertaken with animals of the right age, and bought in accordance with the specification of the Veterinary Department.

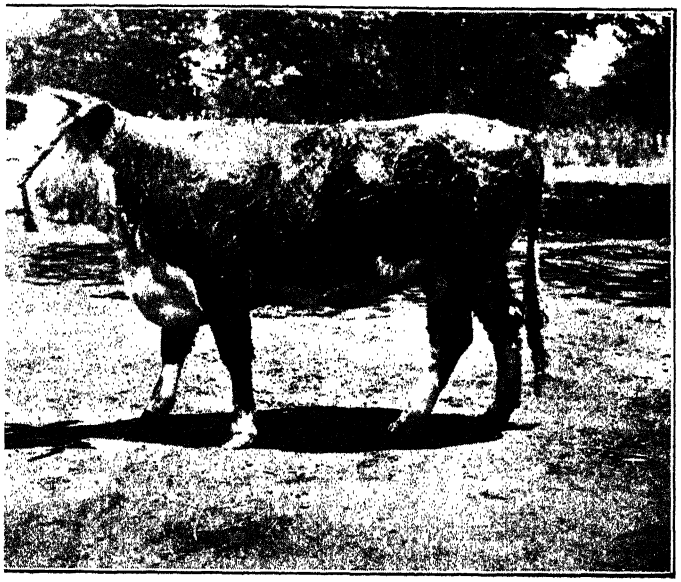
It is greatly to be regretted that the process of inoculation has been somewhat unfairly maligned during the past ten years. It is true that the results have not invariably proved satisfactory, but in spite of the difficulties under which it has been undertaken, the benefits derived from it have far exceeded the losses. In October, 1915, the owners of bulls inoculated in 1911 were circularised, and many of the reports received were so favourable that by special request, and with the object of restoring confidence, some of these are reproduced as an appendix to this article. These are merely a few selected from a great many equally satisfactory, but are sufficient to prove to the man of average business ability that the importation of thoroughbred animals for the improvement of his stock is a sound investment. It is to be hoped that this opinion will be generally accepted, in order that the grading up of our herds may be taken up energetically and at once.

Plasmoses occur in nearly all species of domestic animals in this country, the parasites being specific in respect to the diseases which they produce; that is to say, the parasite of the dog is pathogenic only to canines, the parasites of the ox set up disease only in cattle.

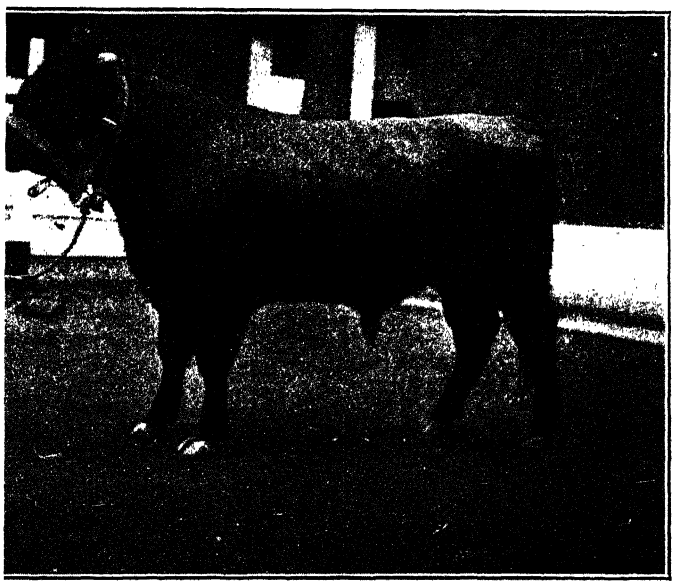




Yearling Sussex Bulls, bred by Mr. L. Glanfield, Ballineety.



Heifer, "Glen II."; recently inoculated for Mr. J. Mack, Gatooma.



1 Bull, "Cluny Marmion"; recently inoculated for Mr. P. H. Gresson, Sebastopol.

The so-called *malignant jaundice* or "biliary fever" of dogs is caused by a parasite (*P. canis*) akin to the redwater parasite of cattle, and is transmitted by the "dog-tick." In this country the commonest form of the disease is characterised by intense anæmia; the bilious form is occasionally met with, chiefly among recently imported dogs or those of finer breeds. Locally-bred dogs, especially those born during the wet season, when ticks are prevalent, contract the disease early in life, and, suffering only from a mild form of the disease, recover and become tolerant, the parasite remaining in their blood for years.

This parasite responds in the same way as the redwater parasite to injections of trypan-blue, which cause it to disappear from the blood-stream. The infected animal recovers and becomes immune, although the parasites remain in its blood. The manner in which this immunity or tolerance is brought about has not been determined, but it is suggested that the drug destroys some parasites and arrests the activity of others. From the degenerated parasites toxins are liberated, against which, during the period in which the parasites are held in check by the drug, the organism of the infected animal responds by the production of anti-toxins; so that when the drug is subsequently eliminated and the surviving parasites again assert themselves, they are opposed by anti-bodies, which neutralise the toxins they produce and render them harmless. In practice, it has been found best to withhold the drug until the blood is freely charged with parasites, when its introduction will cause the destruction of the greatest number of them, and, on the basis of the above theory, will bring about a plentiful production of anti-bodies and a lasting immunity. The indiscriminate application of the drug in mild cases is frequently attended by disappointing results, little or no immunity being established. The parasites often re-appear, giving rise to acute symptoms, when the second application of the dye fails to effect a cure.

Biliary Fever of equines is a disease belonging to the same class which used to be prevalent in this country some years ago after the Boer war, when horses bred in countries free from the disease were imported into South Africa, and some of them made their way to Southern Rhodesia. The parasite is transmitted by the red-legged tick, which is practically ubiquitous

in this country, so that African-bred horses become infected early in life, recover, and afterwards carry the parasite in their blood. Occasionally the disease is met with in old horses whose lowered vitality reduces their immunity, and in all probability many cases of horse-sickness are complicated by a renewed activity of this parasite.

A method of conveying immunity was discovered by Theiler, who inoculated susceptible horses with the blood of young donkey foals which had recovered from the disease. The parasite so obtained was of low virulence, and set up a mild infection, from which the horse recovered and derived immunity.

East Coast Fever is a disease of bovines caused by a parasite, *Theileria parva*, which is conveyed from sick to susceptible animals by the brown tick. No other species of animal is known to be susceptible to the disease, and when an infective tick bites any other species it produces no harm, and itself becomes cleansed from infection. In countries where this disease is enzootic, cattle appear to possess some degree of inherited immunity, but even in such areas the mortality among young stock is appreciable. Experience in this country indicates that cattle of Central African breeds shew a lower death rate than those of local breeds, while the mortality among the latter is lower than among grade stock. It has been observed that the disease appears to increase in virulence by passage through better bred animals, and especially through unthrifty calves of improved stock.

The parasites are not hereditarily transmitted in the tick, but when taken up in infective blood by a tick, they are transmitted by it in the succeeding stage of its development. Thus, if the larva of the tick sucks blood containing the parasite, the tick is infective as a nymph, or, having sucked infected blood as a nymph, it is infective as an adult. The parasite, however, does not pass through the eggs of the tick. Whereas in redwater the parasites persist in the blood of recovered animals for years, the parasite of East Coast Fever no longer exists in the blood of a recovered animal, which is therefore incapable of infecting ticks. Moreover, East Coast Fever cannot be communicated by the inoculation of blood containing the parasite, even when several litres of blood are injected. It is probable that the form of the parasite which is present in the

blood cannot undergo any further development until taken up by the tick; "the corpuscles merely serve as vehicles for the parasites wherein they are housed and maintained until they reach their destination within the tick, which serves as their vector" (Nuttall). The parasite inoculated by the tick makes its way into the internal organs, where by development it forms the so-called Koch's bodies, and probably gives rise to toxic substances. When the life of the host is endangered, the parasites emerge and make their way into the corpuscles, in order that they may maintain their existence by being picked up by the tick.

The fact that the developmental forms of the parasite are met with in the internal organs has suggested a means of conveying the disease with a view to establishing immunity. Infected gland or spleen substance is pounded up into an emulsion, and is injected into the veins of cattle. This gives rise to the disease in the majority of the treated animals, from which 40 per cent. to 80 per cent. may recover. This method was applied in the native territories of the Transkei, where over two hundred and fifty thousand cattle were inoculated, of which 40 per cent. recovered. In practice, however, the disease is generally dealt with by short-interval dipping, and the system of inoculation is only resorted to in exceptional circumstances where dipping is impracticable.

Trypanosomiasis.—This term includes certain diseases of man and the lower animals caused by the invasion of the blood stream by minute flagellated protozoa called trypanosomes from their characteristic movements when viewed under the microscope.

The manner in which these parasites are transmitted from sick to healthy animals varies, but, as far as the trypanosomiases of this country are concerned, the most common method of transmission is by the bite of the so-called tsetse fly, a fact which has long been recognised, and had given rise to the name "fly disease," affected animals being generally referred to as "fly-struck."

The economic importance of the trypanosomiases is greater than appears at first sight. Apart from the actual mortality caused by them, large areas of valuable territory, some sixty million acres in Northern Rhodesia and ten million acres in

Southern Rhodesia, are rendered dangerous or unsuitable for settlement by the presence or menace of the tsetse fly.

In studying these diseases in the past, the greatest importance has been attached to the appearance or shape of the trypanosomes when viewed under the microscope, and elaborate systems of measuring and differentiating have been devised, with the result that innumerable species have been identified. The smallest irregularity in any specimen has prompted some extremist to create a new species, with the result that much valuable time has been spent in this research, which might have been devoted to more practical issues. Another feature upon which species have been created is the virulence of the parasite for different species of animals. But it is possible that these points of difference are sometimes evidence not so much of different species as of different strains of a common species, for it has been found that both the shape of a trypanosome and its virulence for certain animals can be modified by artificial conditions. Thus *T. brucei*, the animal parasite of South Africa, which has been studied very closely since its discovery as the cause of "Nagana" by Bruce in 1896, when inoculated into resistant animals, such as adders or tortoises, produces very small forms, but when transferred from them to rats, highly susceptible hosts, develops forms much larger than normal. It is, therefore, possible that in nature the shape of a trypanosome may be considerably modified by the susceptibility of the hosts in which it commonly maintains its existence.

Again, the virulence of a strain of trypanosome may vary by passage from animal to animal. When a natural strain, that is to say, a strain met with in an animal infected under natural conditions, is studied in the laboratory, it may be found to be virulent for some species of animals and harmless for others, which appear to be insusceptible to it. This resistance, however, may sometimes be found to be more apparent than real. For example, when the cattle trypanosome of the Hartley district was first investigated in 1909, great difficulty was experienced in establishing a strain of the parasite for study at the laboratory, the usual small laboratory animals resisting inoculation with natural virus, but eventually becoming infected after repeated inoculations or repeated doses, their resistant elements probably becoming exhausted

thereby. It was only when a certain rabbit had been taken to the Hartley district, and had been inoculated for the third time with blood from a naturally infected ox, that it developed the disease. From this rabbit it was easy to infect other rabbits. Again, sheep are said to possess a marked degree of resistance to this trypanosome under natural conditions, and this was confirmed at the laboratory. But when once a sheep had become infected by repeated inoculations of infective blood, other sheep were readily infected from it, the disease produced in them increasing in virulence by inoculation from sheep to sheep, so that a strain of trypanosome, at first regarded as non-virulent for sheep, after a number of passages became capable of killing sheep with deadly certainty in less than sixty days.

Thus we see the shape and virulence of a strain of trypanosome greatly depends upon the susceptibility of the hosts to which during its evolution it has accommodated itself. In the so-called "fly-belts" the game harbour trypanosomes, although apparently unharmed by them, and serve as a "reservoir" from which tsetse flies feeding upon them pick up the parasite. But when these infective flies inoculate the progeny of these trypanosomes into unusual hosts, such as domestic animals, upon which they feed, they set up disease, sometimes chronic and sometimes acute, again depending upon the susceptibility of the animal. That the virulence of the strain depends upon the resistance of the host rather than the power of the parasite is shewn by the fact that "fly-struck" cattle may harbour trypanosomes unharmed for months during the dry season, and only develop acute symptoms of disease a few weeks after the first rains, which probably reduce their vitality and powers of resistance.

Although this immunity or resistance against trypanosomes exists, it is not known upon what it depends, and it has at present been found impossible to reproduce it artificially. Certain experiments have shewn that the leucocytes, or white-blood cells, of resistant animals play an important part, while others prove that the serum of such animals, when mixed with virulent blood and inoculated into susceptible animals, will delay and sometimes entirely prevent infection. Unfortunately, it has not been found possible to put this knowledge to any practical use. It is possible that the virulence of the

pathogenic trypanosomes depends upon toxins produced rather than the actual mechanical damage effected by the parasites. There is a trypanosomiasis prevalent among rats in most parts of the world in which the blood of infected animals is swarming with parasites (*T. lewisi*), sometimes more numerous than the red-blood cells themselves, and yet the death of infected animals is extremely rare. On the other hand, when sheep are infected with one of our local trypanosomes (*T. brucei*, var. *rhodesiense*), parasites are rarely found in the blood; nevertheless the disease produced is acute and death inevitable. At present, however, it has not been found possible to isolate these toxins, or to produce anti-toxins to oppose them.

There are two principal forms of trypanosomiasis met with in man and animals in Southern Rhodesia. The first is due to a small trypanosome belonging to the *T. pecorum* group, and affects cattle exposed to the bite of tsetse fly which have previously picked up infection from game or other infected animals in the so-called "fly-belts." Under natural conditions the organism is apparently of a low degree of virulence, which, however, becomes enhanced by passage through highly susceptible hosts, such as cattle of improved breeds or animals whose vitality has been reduced by over-work, under-feeding or unfavourable climatic conditions. In such circumstances, where sufficient tsetse flies are present to bring about the rapid transference of virus from animal to animal, the severity of the disease produced increases, and animals may die with alarming rapidity. Man, horses, mules, donkeys, goats, sheep and dogs are generally immune to natural infection, but exceptions have been met with. Dogs have been known to become infected in an area where the disease had become acute for cattle, and in another district where an exceptional number of tsetse flies was present. Very rarely the parasite has been met with in donkeys, in which it has given rise to a mild infection. Game harbour the parasite, apparently unharmed by it, and indigenous cattle, in areas where fly are few, or which have been rapidly passed through a "fly-belt" and infection has not been heavy, contract a very mild form of the disease, which may not produce any appreciable symptoms so long as other conditions are favourable. It is probable that in a large number of them actual recovery takes place. In cattle the disease is amenable to treatment by injections of

preparations of antimony and arsenic. In outbreaks where the disease has assumed a virulent form and deaths have resulted, remarkable recoveries have occurred as the result of this treatment. It is probable that an actual cure is only effected in a small percentage of cases, but that the application of the drug brings about a state of tolerance similar to that produced in redwater by the application of trypan-blue. It is known that many of the animals, which have to all appearances recovered, continue to harbour the parasite in their blood, and remain unharmed by it until adverse circumstances reduce their power of resistance. A remarkable fact in connection with the drug treatment of trypanosomiasis is that if antimony or arsenic is applied in doses insufficient to arrest the disease, although the parasites may temporarily disappear from the peripheral blood after the first exhibition of the drug, they will again re-appear, and will be found to possess a marked resistance to the drug, and in time, after repeated doses, will become completely immune to it. What is more, if such an arsenic-resistant race of trypanosomes is transferred to another animal, the descendant race of parasite developing in that animal will again prove arsenic-resistant. This power of developing immunity to drugs, which is shared by other species of protozoa, constitutes a grave difficulty in the treatment of diseases to which they give rise.

The second form of trypanosomiasis is due to a parasite to which the undesirable name *T. rhodesiense* was given, but which is now recognised as a strain of *T. brucei*, which, of all South African trypanosomes, has been investigated for the greatest number of years, but was not hitherto recognised as infective to man. It was at first only encountered in certain areas of Southern Rhodesia, such as the Mafungabusi district, and it was at one time thought that certain climatic conditions were necessary for its existence. The recent discovery of cases in districts remote from the original area indicates that this theory may be incorrect. The disease first attracted attention in 1909, when a white man who had travelled from Northern Rhodesia arrived in Hartley, and was found to be infected with trypanosomes. His blood was inoculated by the writer into laboratory animals, and gave rise to a very acute disease in them, and also in sheep, goats and mules. The presence of a trypanosomiasis infective to man caused considerable

alarm, especially when on investigation a large number of game in the tsetse fly (*Glossina morsitans*) areas was found to harbour a parasite of similar appearance. However, it was pointed out that, in view of the prevalence of the parasite in the lower animals, and its extreme virulence when inoculated into man and domestic animals, the natural infection of man must be a rare occurrence. This contention has been proved to be correct, for since the discovery of the parasite, the number of human cases in infected areas has been comparatively few, and it is probable that in natural circumstances man does possess a certain degree of resistance to natural infection. Lately, donkeys in an infected area have become infected, but natives and white men working with them have escaped. Mules exposed for a few days have similarly contracted the disease, but their riders have remained unharmed. Dogs, goats and sheep in a certain native village were shewn to harbour trypanosomes of characteristic type, but no natives were found to be suffering from the disease. In another village, a native woman and her child were apparently the only persons affected.

The disease is very deadly, and does not yield to drug treatment. The parasite disappears after the first exhibition of large doses of antimony, but re-appears and proves refractory to subsequent doses. In view of the uncertainty and unsatisfactory results of treatment in all forms of trypanosomiasis, and the inability to apply the known principles of immunity to any practical use, it is probable that the solution of the problem must depend upon the elimination of the tsetse fly. Just as yellow fever in the Panama zone has disappeared with the destruction of mosquitoes, and East Coast Fever and redwater have been combated by the eradication of the tick, there is every reason to believe that the disappearance of trypanosomiasis from Southern Rhodesia will follow the discovery of a successful method of eradicating the tsetse fly.

The foregoing notes have dealt but superficially with the subject of immunity, but it is hoped that enough has been said to indicate the important part it has played, and may continue to play, in dealing with the many diseases of stock which handicap the pastoral industries of this country. When, as the result of careful investigation and research, the principles upon which this wonderful power of natural resist-

ance depends are more thoroughly understood, there is every reason to believe that most of the ailments of man and the lower animals will entirely disappear.

A Short History of the Ballineety Herd of Sussex Cattle, by Leopold Glanfield, Ballineety.

This herd was started by Mr. L. E. W. Bevan in October, 1908, by the purchase of twenty-eight cows, namely sixteen native cows from Victoria and twelve Angoni or humped cows from East Africa. At the time of purchase, these were all in calf. Fourteen oxen were purchased about the same time.

In May, 1909, Mr. Bevan imported from England two pedigree Sussex bulls, namely, "Rosebush" and "Limehurst Alec," which had been presented to him by the Sussex Herd Book Society, in order to introduce the breed into Rhodesia. These bulls were taken straight on to the farm, and were at once inoculated against redwater and gall-sickness with blood taken from an animal on the farm.

The bull "Rosebush," being eighteen months old, was put to the cows, but the bull "Limehurst Alec," being six months younger, was held in reserve for some time.

When the present owner took over the herd in September, 1910, it consisted of fourteen oxen, twenty-eight cows, two inoculated imported bulls, twelve yearling oxen, fifteen yearling heifers and three calves. By the 23rd October, 1912, the twenty-eight original cows had produced ninety-five calves, sixty-eight of which were the progeny of the bull "Rosebush." In August of that year the two bulls were sent to Enkeldoorn to work among a herd of sixty-three native cows, returning with one hundred and forty-five head to Ballineety in April, 1914. Soon after this they were sold, the bull "Rosebush" passing to Mr. Williamson, who used him on his ranch, and afterwards parted with him to Mr. Dobbin, Omeath Ranch, Umvukwes, who is still using him. This bull must, therefore, have been responsible for several hundreds of calves.

The bull "Limehurst Alec" was sold to the Kingston Farm Syndicate, and has also been responsible for a large number of calves.

During 1911, about fifty Africander-Shorthorn heifers were imported from Cradock, but bad luck was at first experienced with them, about twenty being lost through accidents and poverty. The bull "Limehurst Alec" ran with these up to August, 1912.

By constantly mating imported pedigree Sussex bulls with the above females, a herd has been built up of animals bearing strongly the Sussex characteristics. The half-breds and three-quarter-breds form a very nice herd; they are even in type and colour; and the trouble with some grade animals, namely, that they are slow in breeding, has not been experienced. An average of two hundred and fifteen cows were run on the farm during 1916, yielding one hundred and eighty-seven calves, or 86.9 per cent.

In September, 1911, a dipping tank had been erected on Ballineety, and in 1912 the farm was considered reasonably free from ticks and sufficiently grazed down and developed to warrant the risk of founding a pedigree herd of imported cattle. Brick cattle sheds were erected, with comfortable loose boxes, in order that the imported stock could be housed at night.

In June, 1912, four pedigree Sussex bulls and six pedigree Sussex heifers were imported. These were most carefully selected, and represented some of the leading Sussex herds in the South of England.

	Name.	Breeder.
Heifer,	"Graveney Hawthorn,"	Messrs. L. & G. Finn, Faversham.
,,	"Bonnette's Bouquet,"	Col. W. W. Hammond, Nonington, Wingham, Kent.
,,	"Somerhill Dewdrop 3rd,"	O. E. d'Avigdor Goldsmid, Somerhill, Tonbridge, Kent.
,,	"Tutsham Ballet,"	G. Warde, Tutsham, West Farleigh, Kent.
,,	"Somerhill Fern 2nd,"	O. E. d'Avigdor Goldsmid, Somerhill, Tonbridge, Kent.
,,	"Wadhurst Crumple,"	J. C. Drewe, Wadhurst Hall, Sussex.

Name.	Breeder.
Bull, "Lynwick General,"	J. Aungier, Lynwick, Rudgwick, Sussex.
,, "St. Albans 13th,"	Col. W. W. Hammond, Nonington, Wingham, Kent.
,, "St. Albans 14th,"	Col. W. W. Hammond, Nonington, Wingham, Kent.
,, "Count Daybush,"	O. E. d'Avigdor Goldsmid, Somerhill, Tonbridge, Kent.

On arrival, they were all inoculated by Mr. Bevan at Letombo Camp, and, thanks to their fine constitution, suffered from mild re-actions and recovered, proceeding to Ballineety in July, 1912.

At first these imported animals were grazed in paddocks during the day and housed at night, but after a few months they were considered acclimatised, and were allowed to lie out at night. Now they are never housed except at night time for a few weeks after calving.

This was the commencement of the Ballineety herd of pedigree Sussex cattle. Up to date, the six imported cows have produced calves as follows:—

Cow No. 1 has produced 2 bull calves, 2 heifer calves.
Cow No. 2 has produced 3 bull calves, 2 heifer calves.
Cow No. 3 has produced 2 bull calves, 2 heifer calves.
Cow No. 4 has produced 3 bull calves, 1 heifer calf.
Cow No. 5 has produced 2 bull calves, 2 heifer calves.
Cow No. 6 has produced 1 bull calf, 1 heifer calf.

Two of the female progeny have themselves given birth to bull calves.

During the year 1914 another bull was added to the herd, namely, "Apsley Albert 3rd," bred by Mr. W. G. Fladgate, out of "Apsley Daisy" by "Shillinglee Bewbush 6th," and thus indirectly related to the bull "Rosebush," the pioneer of the herd. This bull was not inoculated, as it was considered that dipping had been practised so long as to justify the risk. Every precaution was taken, however, and the bull was stabled and bedded on sawdust for some time, until a small paddock had been rendered free from ticks by constant dipping. It was then allowed to graze in this paddock, and suitable cows were brought to it. During this

time it was regularly dipped, and later it was allowed to range with the cows on different parts of the farm. It has never been sick, and it is probable that it is now immune. This bull is responsible for the present generation of pedigree calves.

During 1916 four young bulls were sold at good prices, and six bulls of good quality are being offered for sale on 4th April.

The present pedigree herd consists of four bulls, ten cows, three heifers, six yearling bulls (as shewn in the illustration) and two calves. The original stock and their progeny appear to have excellent constitutions, and have had practically no sickness of any kind; the whole of the imported stock is alive to-day, and the progeny disposed of.

Other Records of Inoculated Cattle.

In October, 1915, the owners of bulls inoculated at the Letombo Camp in 1911 were circularised, and many of the reports received were so favourable that extracts from them are published for general information. These are merely a few examples selected from a great many equally satisfactory. It will be noted that the figures represent the results obtained after four years on the farm.

The Shorthorn bull "Aerial Knight" is stated by its owner, Mr. W. E. Morgan, Nyamandhlovu, to have gained first prize and reserve championship at the Bulawayo show in 1914, and to have been responsible for as many as two hundred and fifty progeny. "He is allowed to run in all kinds of weather just the same as any ordinary animal, and has never been sick since he recovered from gall-sickness and redwater."

Mr. Jack Mack, Gatooma, stated that his Hereford bull "Peerless" had developed well, and had been responsible up to October, 1915, for two hundred and twenty progeny.

Messrs. Cecil Roberts & Letts, Heany Junction, stated that their Shorthorn bull "Baronet" had developed satisfactorily in every way since delivery. In 1913 twenty of his progeny had been reared, in 1914 eighty, and in 1915 seventy-nine had been reared up to the time of writing, and twenty

more cows were expected to calve to him. He is said to "stamp his progeny with all his characteristics." It may be explained that in 1912 other bulls were in use and that "Baronet" was crippled through a bad hoof, so did little service.

Miss Jones, on behalf of her brother, Mr. F. W. Jones, Innesfallen, reported on the Sussex bull "Birling Cecil," which was said to have grown enormously since delivery, and, except for an attack of stiff-sickness, to have enjoyed perfect and robust health. His progeny numbered from one hundred to one hundred and twenty head, and were said to be remarkably healthy and a "pleasure to look at."

Mr. H. E. von Eyssen, Manager of De Beers Ranch, Shangani, in writing concerning five Sussex bulls inoculated in 1912, stated that they have developed into fine animals, and have never been sick since they arrived on the ranch. They were running about four months day and night with the cows, and, although never fed or stabled, remained in good condition. At the time of writing, in October, 1915, about three hundred calves had been obtained from them, their progeny doing well. Mr. von Eyssen added, "the second lot of Sussex heifers and bulls and North Devon heifers, which had not been inoculated, gave me rather a lot of trouble with redwater and gall-sickness; I lost four bulls out of twelve, and six heifers out of twenty-four."

Mr. G. Mountford, Selukwe, reported that the Sussex bull "Linton Prince," inoculated in 1911, had gained considerably in weight, and had never been sick. During the four years it had got one hundred and forty-three progeny, namely, seventy-seven heifers and sixty-six bull calves, which had taken after the bull.

Mr. C. E. Simpson, Concession Hill, reported on the Shorthorn bull "Mountain Rover," which he considered to have grown out well, and to be of good size and bone. His progeny numbered about one hundred calves, which were considered unusually good, the mothers being native cows.

A Hereford bull, inoculated for the late Mr. F. Clayton, Salisbury, in 1911, had in October, 1915, been responsible for one hundred and sixty-four calves, and a Hereford bull "Nestor," owned by Mr. C. B. Williamson, Borrowdale, had

in the same time been responsible for one hundred and seventeen calves, said to be a "nice even lot, of true Hereford stamp."

Mr. A. Moorcroft, Bindura, reported that the bull "Dauphine 55th" had developed well since delivery, and had remained in excellent health. It had been responsible for two hundred and twenty-six progeny, the general condition of which was good.

Mr. G. H. Huckle, Inyati, wrote concerning the Sussex bull "St. Valentine," which had grown fairly well. During the first season it had received an injury to the eye, and had got only six calves. At the time of writing, in October, 1915, it had been responsible for ninety calves, which were stated to keep their condition splendidly, especially if fed in the late winter.

Mr. A. Smith, The Wold, Banket Junction, wrote that the Aberdeen Angus bull, inoculated in 1911, "has been in tip top health and condition, and has grown out very well. He runs with a mob of Angoni cows by day all through the year, and is stabled and fed at night. I was rather chary of letting him run at night, owing to wild animals. His progeny up to 1st August, 1915, numbered one hundred and twenty-six; since then to date (25/10/15) this season a further nineteen, making a total of one hundred and forty-five. The calves are a good-looking lot of half-breds, short-legged and stocky, and have come through the dry season very well."

Mr. L. Black, Stapleford, Salisbury, stated that his bull "Wadhurst Gold Link" has made fair growth since delivery, and had remained in good health after his first season. He has produced about one hundred and twenty calves, true to type, robust and good rustlers.

With regard to the progeny of inoculated females, this is often disappointing with the first or second calf, but generally improves. Even the first calves are sometimes satisfactory, as is shewn by the fact that the bull calf of the cow "Green Head Cherry 2nd," inoculated in 1912, was sold as a yearling for the sum of £160, and many others of the same consignment are said to have given birth to healthy, well-developed calves valued at £10 to £50 each.

Cultural Notes on Rhodesian Crops.

By J. A. T. Walters, B.A., Assistant Agriculturist.

ROOT CROPS.

In the economy of Rhodesian agriculture root crops have a smaller place than is assigned them in almost any other country. This is partly due to the fact that, with the exception of potatoes, the market for this class of produce is limited. As to their value for stock feeding, there can be no doubt whatever. Their general adoption in Rhodesia would greatly help to solve the different questions of an adequate rotation for crops, for roots are essentially the crops to which an application of kraal manure can most profitably be applied. For the farmer engaged in mixed farming and feeding his stock, root crops should form a permanent and staple portion of his crops every season. The following notes refer to most of the roots used for feeding purposes which have been experimented with in this country:—

Mangels (*Beta vulgaris*).—This crop can be grown in a great variety of soils, but the best returns are obtained from a rich clay loam. In England yields of over 100 tons per acre have been recorded, but in Rhodesia the average yields over a number of years do not exceed 15 tons per acre. Seed is sown in rows 2½ feet to 3 ft. apart. It is best to sow thickly, and subsequently to thin out the plants to 8 to 12 inches apart in the row. Blank spaces may be filled up with young plants, and transplanting may be done once the plants have shewn four leaves. The seed sometimes takes as long as 14 days to germinate. For this reason it is advisable to mix a little buckwheat seed with the mangel, as the buckwheat germinates quickly and shews the position of the rows for cultivation. Kraal manure should be applied to this crop at the rate of up

to 6 tons (or 12 Scotch cart loads) per acre. This should be applied some time before sowing, and ploughed under. The crop responds well to a light top dressing of nitrate of soda when the plants are a few inches high.

An average analysis of mangels shews about 9-10 per cent. of dry matter. The feeding value of the mangel is, however, very high, on account of its easy digestibility. It is especially recommended as a feed for milch cows, for which purpose it is probably the best of the succulent foods. The following analyses shew how the mangel compares with the sugar beet and maize ensilage:—

	Water.	Protein.	Carbo-hydrates.	Fat.	Ash and Fibre.
Mangel	91	1.5	5.5	0.2	1.8
Sugar beet	86.5	1.6	10.0	0.1	1.8
Ensilage (maize) ...	75	2.2	15.0	1.0	6.8

POTATOES (*Solanum tuberosum*).—This crop is usually grown as a "money" crop in Rhodesia, and consequently the farmer is prepared to take a considerable amount of trouble to secure big yields. Potatoes require a fertile loamy soil in good mechanical condition, loose, friable, deep and mellow. With care and preparation it may be said that most of the red soils of the country make an ideal bed for this crop. Abundance of humus is desirable, and this should be applied either by ploughing in a green crop the previous season or by applications of kraal manure, or both. Kraal manure should be well rotted—fresh manure should not be used—and quantities up to 10 tons, or 20 Scotch cart loads, may be applied per acre. Experiments have shewn that an additional dressing of fertiliser will greatly improve the yield, and the dressing recommended consists of 60 lbs. double superphosphate and 60 lbs. of nitrate of soda, costing in normal times 25s. to 30s. An extra yield of 400 lbs. at 1d. per lb. will more than cover this outlay. The fertiliser may be applied either above or below the potatoes, but it should not be applied in immediate contact with the tubers.

The crop is generally planted in furrows about 36 inches apart, with 12 to 15 inches between the tubers, and in Rhodesia it is usual and advisable to use whole tubers only. Cultivation between the rows should be shallow, and ridging is not necessary until the crop is about to flower. If the tubers have

been planted 4 inches below the surface of the soil, ridging will not be necessary at all.

The first crop is usually planted immediately after the frost in August or September, either under irrigation or in a situation sufficiently moist to bring the crop to maturity in November or December. The main crop is planted from December to February. This last date is sometimes recommended, in order to provide tubers as seed for the following season, the tubers being allowed to remain in the ground during the winter. The varieties usually planted in Rhodesia are Factor and Up-to-Date, both medium-maturing varieties, exceedingly hardy, and producing good crops of marketable tubers. The Early Rose variety, once a favourite for the early crop in August, has practically disappeared, on account of its light yields. About 1,000 lbs. of tubers (10 boxes or 60 bushels) are required to plant an acre. The custom in this country is to plant the medium and small sized tubers every year. But farmers should not forget that it would pay to select the heaviest yielding plants, which should be harvested separately, and to plant *all* save the smallest tubers from these. In this way the rapid deterioration of seed so often complained of would be checked. The chief points that potato breeders have kept in view in recent years are:—Increase of crop, improved flavour, smooth and even surface, immunity from disease.

The tubers from the early crop may often be used for the main crop in January. The tubers meant for seed should be stored in a light shady place until they are green, then they should be covered lightly with straw until they sprout. None but sprouted tubers should be used for planting.

The average yield of potatoes per acre for Rhodesia works out on the returns for 1915-16 as 3,060 lbs. per acre. This would seem to be unduly low, and compares as follows with the returns obtained in other countries:—England, 7 tons per acre; Germany, 6 tons; Ireland, 4½ tons; Russia, 3 tons; United States, 2½ tons.

Bulletins on the diseases and pests to which the potato crop is liable have been prepared by the Entomologist. They consist of the following, which may be had on application to the Department of Agriculture:—

Bulletin 158—Ladybirds injurious to potatoes.
,, 172—Diseases of the potato tuber.
,, 233—Does it pay to spray potatoes in Southern Rhodesia?

SWEET POTATOES (*Ipomœa batatas*).—This crop will flourish in much poorer soil than is considered necessary for potatoes, but here again humus is necessary, and a good crop cannot be assured without kraal manure, unless it follows a green crop ploughed in, or the soil is naturally rich in organic matter. This crop is almost invariably planted out from slips, and these slips may be prepared from the tubers as follows:—Prepare a hot bed of manure 6 inches deep, cover with 2 inches of sand or soil. On this, place the tubers close together, but not touching each other. Cover the tubers with 3 inches of soil, water liberally and shade. When the shoots are 3 inches high, they can be removed and others take their places. This takes about five to six weeks. After removing the first lot of shoots, the tubers should be allowed to remain to produce successive lots of shoots, which they do every ten days. Several improved and early varieties have been introduced from time to time. One early and prolific variety, known as the American Sweet potato, produces ripe tubers the same season as planted, and is an erect variety usually obtainable in most districts. Small quantities will be available from the Department of Agriculture this coming season, but the slips do not travel well over long distances. The Natal variety takes longer to produce mature tubers, and is a trailing variety. The word "yam" is sometimes applied to the sweet potato, but the yam is a distinct and separate plant (*Dioscorea batatas*), which also produces edible tubers somewhat resembling sweet potatoes.

The rows are usually made 3 to 4 feet apart, and the slips are placed about 18 inches apart in the row, thus requiring about 7,000 slips per acre. The slips are sometimes planted on ridges, but this method has not much to recommend it, while the danger from drought in the early stages is considerable. The crop might be ridged in February if the land is inclined to be wet, but good crops are obtained by planting and leaving on the flat. A good return per acre should amount to 40 bags (5,600 lbs.). American yields greatly exceed this quantity.

JERUSALEM ARTICHOKES (*Helianthus tuberosus*).—This crop has not yet figured largely in Rhodesian agriculture, principally because the tubers remain good with difficulty through the winter. For this reason, it is necessary to plant the artichokes as early as September or October. Tubers planted at the agricultural experiment station in October were ready for lifting by mid-March. This crop will grow on almost any well-drained soil. It will thrive on soils usually too poor for many other crops. The main requirement seems to be a dry soil. If the soil is wet, the tubers rot.

Although of much value as an article of human food, the artichoke is particularly recommended for the feeding of pigs. The tubers are smaller than potatoes, and are planted 18 inches apart, in rows 3½ feet apart. About 500 lbs. will plant an acre. This year's crop at the experiment station, Salisbury, seems to be exceedingly promising, in spite of the long drought experienced this summer.

CARROTS (*Daucus carota*) thrive best in light soil, well manured for a previous crop. Hence they can profitably be grown after a potato crop. This crop does fairly well under Rhodesian conditions, being rarely attacked by insect pests, and standing drought well when once established. Yields at the agricultural experiment station, Salisbury, vary from 3 to 5 tons per acre under normal conditions.

The seeds germinate slowly, usually taking 10 to 14 days before the plants appear above ground. About 5 to 6 lbs. are required for sowing an acre. The variety which has consistently given the best results up to the present is that known as "White Belgian."

MISCELLANEOUS.—A new root crop imported into this country from Portuguese East Africa by Messrs. Wightman and Co., of Salisbury, and known as Madumbies, promises well at the agricultural experiment station, in spite of the drought. This crop is probably identical with the American crop Taro (*Colocassia esculenta*). Cruciferous root crops, such as kohl-rabi (*Brassica caulorapa*) and turnips (*Brassica* spp.), have never done well under field conditions, being extremely subject to the attacks of innumerable insect pests at all stages.

Nature Notes.

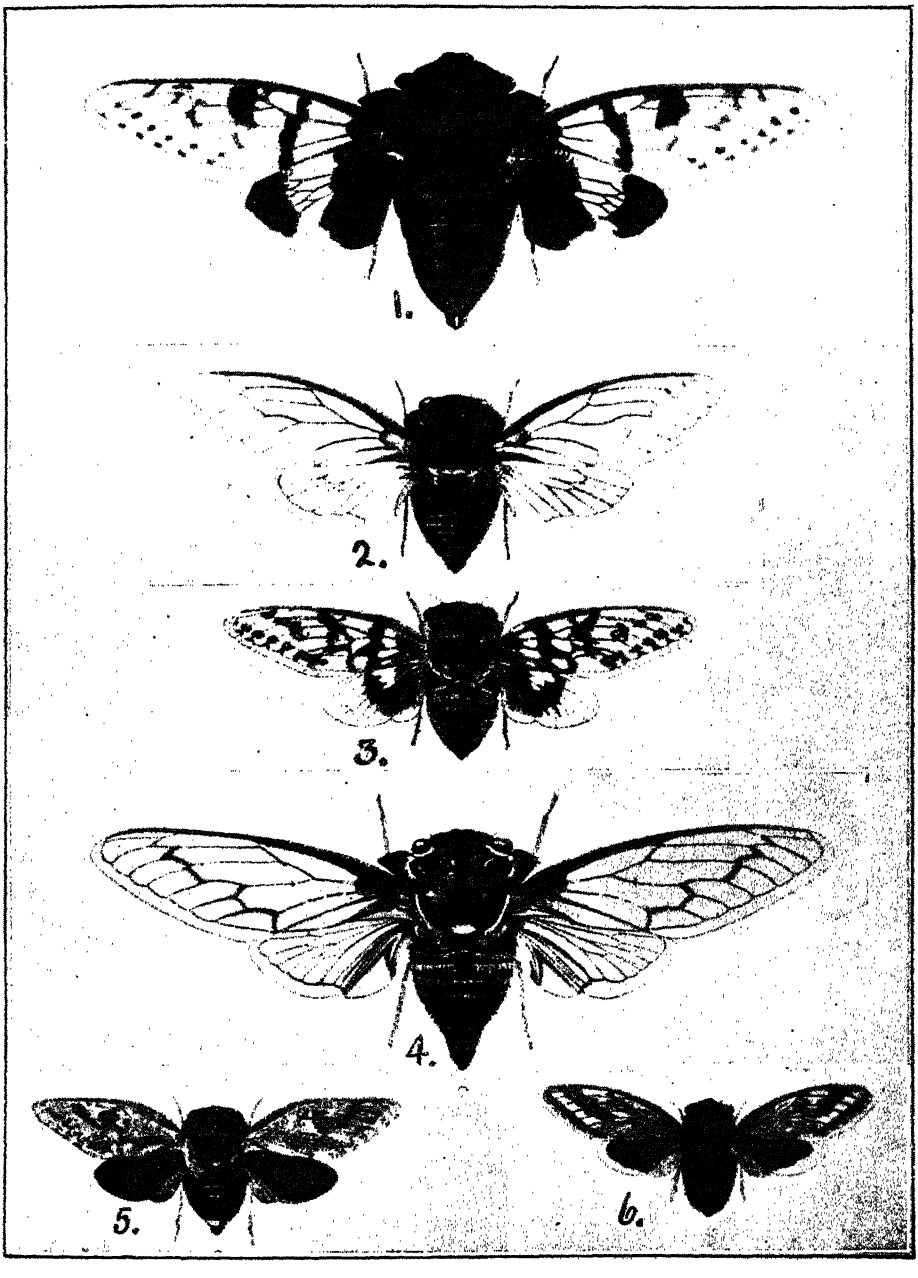
II. CICADAS AND THEIR RELATIVES.

By C. H. Pead, M.I.M.M.

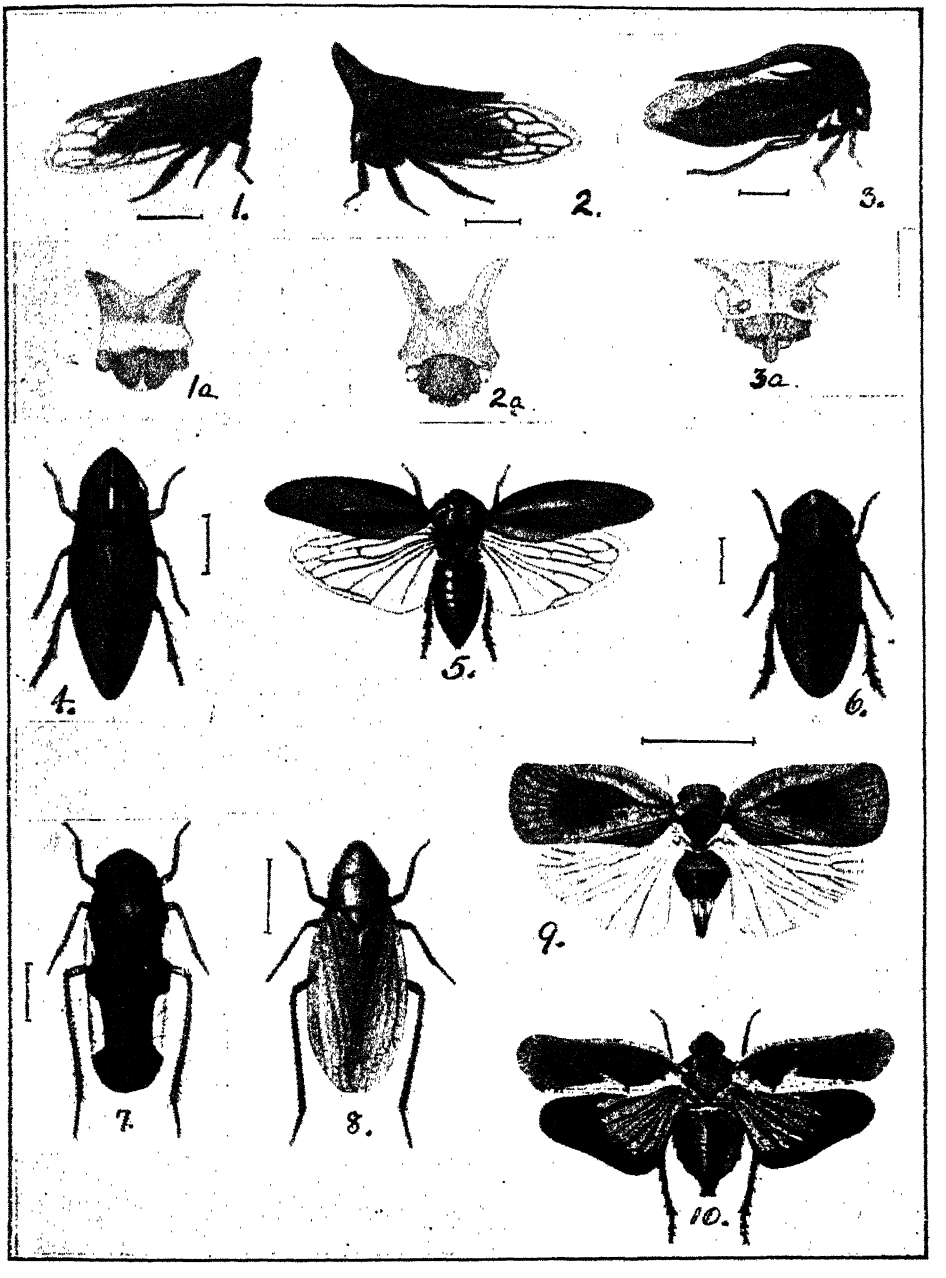
It is the purpose of this article to offer a few remarks upon the *Cicadidæ* and allied families, and the interest that these should have for the readers of this *Journal* will be developed in the course of it.

The Cicadas, as they are usually called, are to be found in Southern Europe, Asia, America, Africa and Australia, as well as in many tropical islands, so that their distribution is wide; and when a large group of insects is found spread over so much of the world, it is certain they must be able readily to adapt themselves to varying conditions, especially in respect to food. From their distribution we may also be certain that they support existence upon widely distributed animals or plants. And this is the case, for their chief food is the juices of trees, grass and grass-like growths, and the commonest plants, among which all species of acacia seem to be their favourite haunt; while in the immature, larval and nymph stages, they feed on the roots of the same kind of plants.

While there are very many well-marked and distinct species of Cicadas, there are no popular names to represent them, and they are but litle understood. There is, truly, a popular name for Cicadas as a whole in the Cape Colony, where they are called "Christmas Bees," and the name may help some of the readers of this *Journal* to recognise the insects referred to, but it is an unfortunate name, for, in the first place, the insects do not appear only at Christmas time, and they are not bees, nor are they even close relatives of the



Cicadas—Plate I.



Cicadas—Plate II.

large order of the *Hymenoptera* to which the bees belong. On the contrary, they are bugs, or, in other words, they have mouths constructed for suctorial purposes, as opposed to mouths formed for masticatory purposes. They obtain their food by suction only, being armed with a nostrum, the name given to the suctorial mouth organ, with which they are enabled to penetrate deep into the fibres of their food plant and to absorb its juices.

It is, however, not only with the Cicadas that this article deals, but also with the allied families, most of which the general reader will be quite unacquainted with by name. These families run as follows in order of relationship:—*Cicadidæ*, *Fulgoridæ*, *Membracidæ*, *Cercopidæ*, *Jassidæ* and *Aphidæ*. The names of the families are given, so that a reference to the plates may enable readers to recognise the insects referred to; for, strange as the names will be to most, the insects themselves will be known to many.

The *Cicadas* are chiefly noticeable from the loud rattling call the males produce. This stridulating, as it is called, is made for the purpose of attracting the females, who are noiseless, although they possess the stridulating organs in an imperfect state. The insects emerge in the perfect imago state from August to about the end of February. The first to emerge are those that seek their food from grass stems, and generally belong to the smaller species, while the larger ones that feed on trees begin to appear in September—as soon, in fact, as the sap begins to rise and the leaves to open.

On account of the loud and persistent stridulation, it will be within many people's observation that these creatures are about us in very large numbers for two or three months each year; but it is not so obvious, though a fact, that the smaller species are around us in even greater numbers among the grass and veld plants. These last do not stridulate in the same way as the larger ones, for the vibrations of the call are so rapid that the sound is rather a chirp than a sustained call, and somewhat resembles that of the crickets, and in consequence their presence is not so readily appreciated. They are all most voracious feeders, and the juices from which they get sustenance are discharged almost as quickly as they are absorbed. To such an extent is this the case that in early

times some trees received the name "rain trees" on account of the constant drops of water that fell from them, and it was not till many years later that this moisture was traced to the frequent discharges of the Cicadas feeding among the branches. A traveller in Rhodesia mentioned to the writer that he had noticed drops of water falling from a tree under which he was resting on a dry, hot day, and that he was unable to trace the cause of it. There can be little doubt that it was due to the presence of Cicadas. Except when they are calling, these insects are very inconspicuous and difficult to see. When disturbed, they frequently squirt a liquid in the direction of the cause of alarm as they rise in flight.

The covers of the wings, known as tegmina, are often beautifully coloured, giving the insects a handsome appearance, even the smaller species being finely shaded and mottled. The suctorial mouth, or nostrum, is long, and strongly widened at the base, and is sufficiently powerful to be inserted into the fibres of the tree or plant on which the insect feeds, while the forelegs are strongly flattened, so that they act as levers to aid in this act of inserting the nostrum. When not in use, the nostrum lies flat beneath the head and thorax, and is not neatly coiled up into a spiral as is the case with butterflies and moths.

The female is provided with a strong, scythe-like and lengthy ovipositor, similar to that of the Orthoptera or grasshoppers, by means of which she is enabled to place the eggs well below the surface of the ground, or in some cases beneath the bark of trees. This apparatus is exsertible at will, and is not an impediment to flight, as in the case of the grasshoppers. The males and females are very similar in appearance, having as a rule the same marks and colours, though a difference in colour in one case has been noted. In form, the only notable differences are that the females have slightly longer abdomens and the stridulating organs less well developed.

The head of the Cicada is squarely built and powerful, and is the least elegant part of the insect. It is, no doubt, thus heavily made for the purpose of aiding in the insertion of the nostrum between growing woody fibres. A peculiar character it possesses is that in the centre of the forehead three

ocelli, or simple eyes, are placed, and always in a triangular position. The character is so constant that the Cicada may be distinguished by it from members of the allied families. The other families possess ocelli, but they are never set in a triangular position in the centre of the forehead.

In the course of its growth, the Cicada passes through three main metamorphoses—from the egg or ovum to the grub or larva, from the grub to the chrysalis or nymph, from the nymph to the imago or perfect insect; besides which it frequently changes its skin in the larval condition to allow for growth. The metamorphosis from larva to imago, like that of the Neuroptera (dragon flies, etc.) and the Orthoptera (grasshoppers, etc.), is said to be incomplete, meaning that it does not retire like moths and butterflies into a perfect cocoon and lie for a period quiescent, but always has and uses the power of motion and of feeding, and shews throughout the whole of this stage, though incompletely, the form of the perfect insect.

The larval stage of the insect is remarkable for the slow growth that takes place, and is often extended over a period of several years before maturity is attained. There is one in America, the growth of which is so protracted that it has received the name of "The Seventeen Year Locust." It is unfortunate that a popular name of this kind should so inaccurately describe this insect as to call it a locust, but it is not the only instance of the kind, for another Cicada in America is known as "The Harvest Fly."

The *Fulgorids* are nearest to the Cicadas, and some of them, in the shape of the head and body, are not unlike the latter; but for the most part they are chiefly conspicuous for the elongated and eccentric shape of the head and tegmina. The heads of many of them are produced forwards to an astonishing degree, giving them an extraordinary appearance, while others have the heads very short and blunt; others again have the tegmina with costal margins much swollen and roundly extended, or scolloped, or very much produced in length. The sub-family, *Fulgorinæ*, includes insects which are nearly as large as an ordinary Cicada, but after this the greater part of the representatives of the family are small and insignificant.

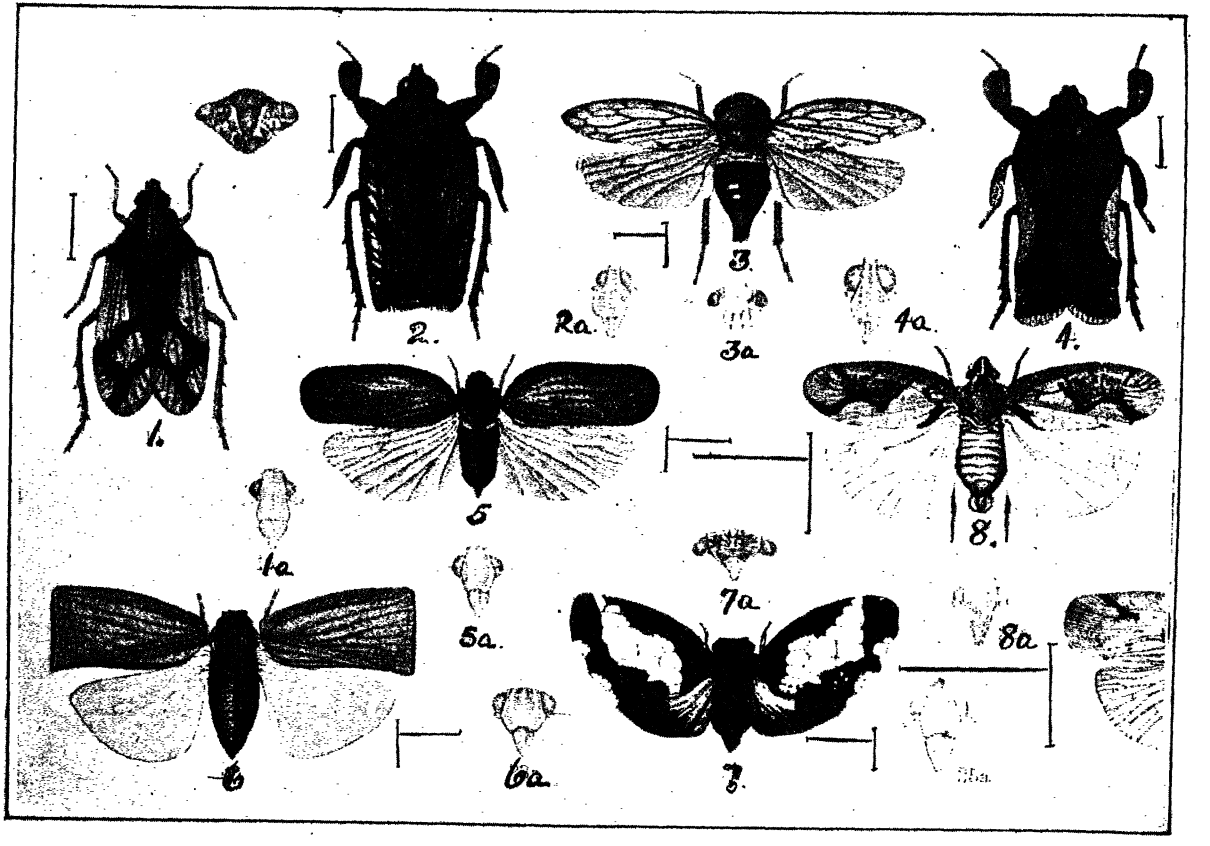
They frequent the same localities as the Cicadas, and feed by suction upon trees, grass and common veld plants, but, not being armed with the powerful nostrum of their larger relatives, they prefer young shoots and leaves for their operations, rather than the older growths.

The metamorphoses of these insects are similar to that of the Cicadas, but the time occupied is probably very much shorter, and at longest not more than a year; information concerning their life history is, however, very difficult to obtain. It is quite possible in respect of some of the smaller species that their life cycle, as is the case with the following families, comprises only a few weeks. In such an event, there are doubtless several broods hatched out in each summer season. The number of Fulgorids produced each year in Rhodesia is probably less than the number of any of the other families mentioned, but there are still numerous individuals to be found in every direction. The popular name for these insects is "Leaf Hoppers," but under this term are also included the two families, *Cercopidæ* and *Jassidæ*, dealt with later on.

The *Membracids* are among the most strangely formed insects. So weird is their shape that an early writer designated them "Little Devils." This peculiar appearance is due in considerable degree to a long thin shield-like process, which runs from the back of the head to the end of the abdomen or closed tegmina; and it is often formed with knobs, branches or spines that are very erratic in shape. They are small insects, mostly unicolorous, and not brilliantly marked, but the tegmina and wings are delicately formed.

Their life is passed in a sluggish manner, and they seldom seem to move from the branch of the plant upon which they are born. They are reluctant to take wing, and when disturbed, pass round the branch on which they rest.

All the members of the Homoptera, the sub-order to which the families we are considering belong, excrete juices, but the Membracids do so to a greater degree than their relatives. The Cicadas, Fulgorids and Membracids also exude a wax-like substance through the abdominal joints, but the latter do this more constantly and regularly than the two former families. This exudation has a peculiar fascination for ants, which devour it greedily. With the Membracids they do more, for



Cicadas—Plate III.

they herd them and tickle them with their antennæ and fore-legs, as they have been observed to do also with Aphides. Such is the ants' love for the Membracids that they even find the eggs, and watch carefully for the emergence of the grubs therefrom, nor do they ever appear to leave them afterwards; some of the ants are always in attendance, and they will fight as fiercely in defence of these creatures as they will in defence of their own nests. In fact, it is possibly due to the aid afforded by the ants that the Membracids have gradually lost the habit of taking to flight in their own protection.

The eggs of Membracids are laid on the branch, generally on the lower side of it, of the tree or shrub on which their life cycle is afterwards passed. They emerge as grubs, but quickly pass into the nymph stage, and, after various changes during growth, when they cast their skins, they reach the adult, imago state. During all these stages they move but a few inches, unless disturbed, and their life cycle extends probably only over some three weeks, unless it be in the egg stage. During their entire life after emergence from the egg they live by suction only, and practically they are always feeding.

The *Cercopids* are small insects for the most part, some of them being exceedingly so, with rounded tegmina and wings, and they have the joints of the hind legs swollen and spined. The head is massive and typical of the family, and some of them are beautifully marked and coloured. They frequent the leaves of trees, small plants and grass, and are often congregated together in large numbers. They take to flight readily, and, if an acacia branch be beaten with a stick, they can be seen flying out of it sometimes in almost a cloud. Their colour is protective, being similar to the plant they feed upon, so that many of them are green, the colour of leaves, others brown or yellow, like dead grass. They are frequently attracted to light in considerable numbers.

The *Jassids* are very small creatures, and many of them not unlike the Cercopids, but others are notable for peculiarly elongated and flattened heads. They have rather long hind legs, which are freely spined, and are protectively coloured green, brown or yellow. They appear in great numbers, feeding on leaves and grass, but are seldom noticed because of their small size. In walking through dry grass, dried chips

may be seen breaking off, and being thrown in front of the feet of the walker. This actually takes place, but a close examination will disclose that the larger number of these apparent chips are insects, Jassids.

Of the life history of the two last families very little is known, but there are probably several broods in each year, the life cycle lasting some three or four weeks. Of the *Aphids*, to which we now come, the life history has been very carefully worked out, and it is an astonishingly complicated one, but this is not the place to enter into it. These insects are known to most under the name of "green fly," and they are a great pest to horticulturists, the ravages they commit being at times most disastrous. The damage they do is conspicuous, and has long been noted, because the insects congregate together, and often destroy the plant they rest upon, whereas the families previously mentioned are more distributed in their habits, and the damage they cause is likewise distributed and less apparent.

Associated with the *Aphidæ* are three other families of minute insects, namely, the *Psyllidæ*, *Alleurodidæ* and *Cossidæ*, the two former often mistaken for Aphids, and the last comprising the scale insects, mealy bugs, spit insects, etc.; and these, especially the last, are conspicuous from their habit of congregating together in large numbers, and thus causing much damage to vegetation. All of them live by suction only, and upon the juices of the plants they frequent.

The ravages of caterpillars, locusts, etc., are sufficiently apparent, since they destroy the plants they attack, but the damage caused by Cicadas and allied families is overlooked, and the insects themselves are not studied, and information concerning them is not collected. This is to be regretted, for the damage they cause in the aggregate is far in excess of that caused by any of the ordinary pests. When crops fail for lack of rain, they would have resisted the drought often for two or three weeks longer but for the attacks of these insects, which persistently sap the vigour of the plants during their growth by depriving them of a considerable quantity of life-giving sap. In Europe it has been estimated that these homopterous insects destroy annually one-seventh of the total vegetable growth. If this is true, it is probable that in

Rhodesia, where there are many more of the insects, they account for not less than one-sixth of the total growth, but their efforts act more in the direction of impairing the vigour of the plants than in total destruction.

The only remedy that can be suggested against their depredations is cultivation. They mostly seek close growth, such as that offered by veld plants and grass, and on well cultivated ground fewer representatives of these families will be found than elsewhere.

EXPLANATION OF PLATES.

Cicadidæ.

Plate I. Fig. 1. Ioba leopardina.
2. Platypleura brevis.
3. Platypleura marshalli.
4. Platypleura quadraticollis.
5. Platypleura haglundi.
6. Numza basimacula.

Plate II. Fig. 1. Xiphistes concolor (Membracidæ).
2. Xiphistes subereta (Membracidæ).
3. Tshaka naturalis (Membracidæ).
4. Clovia centralis (Cercopidæ).
5. Ptyelus flavescens, var. Rennei (Cercopidæ).
6. Cordia albilatera (Cercopidæ).
7. Platyretus tricolor (Jassidæ).
8. Parabolocratus virescens (Jassidæ).
9. Ulundia decisa (Fulgoridæ).
10. Mamatola renatus (Fulgoridæ).

Plate III. Fig. 1. Magama insignis (Fulgoridæ).
2. Elasmoscelis rhodesiana (Fulgoridæ).
3. Dagama novata (Fulgoridæ).
4. Elasmoscelis trimaculata (Fulgoridæ).
5. Achæmenes costalis (Fulgoridæ).
6. Paranotus rufilineus (Fulgoridæ).
7. Lugardia mimica (Fulgoridæ).
8. Uysanus cameroni (Fulgoridæ).

All specimens were photographed from the coloured plates in Distant's *Insecta Transvaaliensia*.

Diseases of Poultry.

By Frank Sheppard.

It is not the writer's intention in these notes to give a full description of all the various diseases and ailments to which poultry are subject, but merely to give a few hints regarding the treatment of those most prevalent in this country.

When starting poultry keeping, it is not necessary to obtain a stock of the many medicines and pills which are advertised in the various poultry publications. They are usually good, but expensive, and often difficult to obtain at short notice. It is quite possible to cure the majority of diseases and ailments with the few common remedies usually found in Rhodesian households.

Practically all that is necessary for the treatment of ailing birds is a small supply of permanganate of potash, carbolised vaseline, iodine, quinine tablets, paraffin oil, Epsom salts, glycerine, eucalyptus oil, sulphate of copper, sweet oil, vaseline and insect powder. These, together with an old teaspoon, an old pen knife with a very blunt small blade, a small nail brush, a bunch of tail or wing feathers, and common sense, are practically all that are required to furnish a poultry hospital.

A few isolation pens should always be erected where poultry are kept in any numbers. These need not be very elaborate, but should be easily cleaned and free from draughts and damp, but at the same time they must be light and airy. Also they should be placed in such a position that other fowls have not access to the outside of the pens.

When a bird is seen to be ailing, it should be caught and treated at once. If the disease is allowed to develop, it is more difficult to effect a cure, and more time is wasted, and if the

disease is contagious, there is every chance of it spreading if the bird is allowed to remain with others.

Anæmia.—Anæmia is usually caused by poor feeding, overcrowding and lack of fresh air in the sleeping quarters.

Symptoms.—The chief symptoms are the dull and listless appearance of the bird, poor appetite, and the pale colour of the face and comb, also inside the mouth.

Cure.—A few drops of an iron tonic, such as tincture of iron, in the drinking water should be given, and good food, a little raw meat and fresh green food.

Bronchitis.—Bronchitis is usually caused by damp and sudden changes in the weather. It is very prevalent at the early part of the wet season amongst badly housed birds.

Symptoms.—The most readily noticed symptom is the rattling in the throat, hence the name "rattler," often given to affected birds; a slight discharge at the nostrils will also probably be noticed.

Cure.—A teaspoonful of glycerine given daily, also one or two drops of eucalyptus mixed in vaseline and applied round the nostrils. Keep the bird free from damp and draughts.

Cold or Catarrh.—Colds are usually caused through damp and draughts, also overcrowding and heated sleeping quarters.

Symptoms.—The first symptom is a slight discharge at the nostrils, and probably small bubbles and matter in the eye. These are not readily noticed by a novice, and the disease is allowed to develop till the discharge from the nostrils greatly increases and the face becomes swollen.

Cure.—The bird must be isolated immediately. The face should be bathed in a warm solution of permanganate of potash and the nostrils frequently cleansed to allow a free discharge of the mucus. A small quantity of copper sulphate or a drop or two of eucalyptus should be added to the drinking water. Half a menthol and eucalyptus lozenge will also be found beneficial.

When slight colds appear amongst flocks of growing chicks, they must be treated at once. Look to the cause of

the cold. Add finely chopped up onions to the soft food and permanganate of potash to the drinking water. If this simple cure is given immediately, all signs of colds will disappear in a few days.

Chicken Pox.—Chicken pox is frequently met with in tropical and semi-tropical countries, but is little known in colder climates.

Symptoms.—Chicken pox is a highly contagious disease, and all ailing birds must be isolated immediately. An affected bird will be noticed by the small wart-like growths which appear on the face, comb and wattles.

Cure.—The growths should be treated with tincture of iodine. Epsom salts should be given in the drinking water, and a good supply of fresh green food also given. The food should not be of a heating nature.

While dealing with chicken pox, a few words on the form of this disease, usually termed "wart disease," which attacks chickens in Australia, may be interesting. This disease is only met with for a few weeks in the year, during February and March. Autumn hatched chicks suffer very severely, also those hatched the previous spring, only in a less degree, whilst birds hatched the previous autumn are only very slightly affected. Some writers maintain that mosquitoes are the cause of this form of chicken pox, but the best authorities deny this, as the mosquito season lasts about six months, and the disease is only prevalent about six weeks. The real cause appears to be unknown up to the present. It appears to be difficult for many Australian breeders to keep their birds clear of wart disease, but the regular use of Epsom salts renders the attacks very much less severe.

White Comb.—This is usually noticed in large combed birds—Minorca and Leghorn cockerels. It is easily recognised by the white flour-like substance which appears on the comb and sometimes on the face. It is contagious, but not dangerous.

Treatment.—Wash the comb with a mixture of vinegar and water, and, when dry, apply carbolised vaseline to the diseased parts.

(*To be continued.*)

Correspondence.

COMMENTS ON EXPERIMENTS.

To the Editor,

Rhodesia Agricultural Journal.

Sir,

I have been analysing a few of your figures regarding the feeding experiments between old and young oxen published in the February *Journal*. From the results, I consider your figures are inclined to give the experiment a totally wrong impression.

The old oxen weigh at commencement of feeding 8,020 lbs., approximately 1,000 lbs. each; the total gain was 175 lbs. each. This gain would be entirely meat, as the viscera would remain practically the same, therefore these oxen when bought would have killed at 51 per cent. of carcase. (Yet you say they were too poor to remain in the span.) For these you paid 10s. per 100 lbs. live weight.

Now take the young oxen. These averaged 750 lbs. when bought, and gained 262 lbs. each during feeding; therefore their carcases when bought would only have killed out 40.9 per cent. carcase, for which you paid £1 per 100 lbs. So you are starting the young oxen with a very big handicap.

Over the whole time the young oxen gain 2 lbs. per day per head, whereas the old oxen only gain 1⅓ lbs. per day per head. If they had both been bought at the same price per 100 lbs. live weight, the young oxen would have shewn the best returns, in spite of the fact that at the start they had the smallest percentage of carcase.

I am, etc.,

W. N. GEBBIE.

Makwiro,
19th February, 1917.

MR. GEBBIE'S CRITICISM OF CATTLE FEEDING EXPERIMENT No. 3.

To the Editor,

Rhodesia Agricultural Journal.

Sir,

In reply to Mr. Gebbie's letter of 19th February, I beg to point out as follows:—

1. There are no grounds for assuming that the gain in live weight of the old oxen was entirely carcase. On the contrary, the viscera probably gained in weight very considerably.

2. The gains obtained by feeding (especially in winter feeding and in the case of old oxen) are not confined to the additional increase in weight. A higher dressing percentage and a general increase in value of each and every pound of the animal is obtained.

3. The old oxen, which are charged to the experiment at £5 per head, were valued by competent farmers at from £4 to £4 10s. per head. They were sold, as stated, at £10 per head on the hoof to one of our most experienced butchers to supply a compound meat contract. The price actually worked out at approximately 28s. 6d. per hundred.

4. The young oxen were purchased at the same price as that at which Messrs. Dimmock & Rawson were selling their mates week by week to the public, and they were sold as stated for £2 per hundred for the best trade.

I submit that the impression to be gained from the figures in question is that, owing to the restricted nature of the local trade and the demand for compound or second-class meat, there is more profit at the moment in feeding large framed trek oxen, even though they be old, than in feeding smaller but very prime animals. Such old oxen, however, are never likely to be saleable overseas, and as this is the trade on which Rhodesia must ultimately rely, it is essential that such experiments as the one in question be continued until we arrive at the best type of ox, in point of age and size, to feed for the

overseas trade, and the best and cheapest kind of food on which to feed him.

Yours, etc.,

R. C. SIMMONS.

Agricultural Department,
25th February, 1917.

COST OF MEALIE PRODUCTION.

To the Editor,

Rhodesia Agricultural Journal.

Sir,

Please allow me to lend support to Mr. H. D. Rawson's criticism appearing in your December issue. I consider that 3s. 6d. as the production cost of a bag of crushed mealies cannot be regarded as a commonsense statement by experienced men. I have heard a farmer say that he could in a good season produce a bag of mealies for less than 2s. It does not appear to occur to some men that it is necessary to have some regard to a bad season, and bad seasons have not been the exception lately. This season, for instance, enormous damage has been caused by the deluge, which, in my opinion, is quite as bad in its effects as a drought. Personally, I am rather afraid to reckon up what the cost of production will be. I hold the view that a great many farmers are growing mealies to-day in Rhodesia at an actual loss, and are really living upon side lines—cream, butter, eggs, etc., and side crops, if lucky enough to find a market for same. Very few seem to take the trouble to try to find out why they remain season after season practically in the *status quo*, although a certain hazy notion exists that something is wrong. Will you allow me to state what it costs me to supply the European market with a bag of maize in normal times? I am thirteen miles from a railway, and I think this distance typical:—

	£	s.	d.
Cost of road transport and forwarding ...	0	1	2
Cost of sack	0	0	10½
Cost of power threshing	0	0	3
Interest on bank advance	0	0	3
Rhodesian flat rate	0	3	0
Cost of production	0	4	6
Total	£0	10	0½

The only item to hang up an argument upon in the foregoing is that bearing upon cost of production, all the others being easily proven. It would be interesting to hear the views of other farmers upon this subject. I recognise it to be a thorny one, well worth discussion in your columns. I would assert, however, that no one with less than five years' farming experience here has any right to enter into any discussion of this nature. It is absolutely futile to base costs upon any one single season. Five at least is necessary to arrange an average from. The other items on my list speak for themselves, and I have come to regard commenting upon them as hopeless.

May I refer, in conclusion, to the co-operative experiment reports appearing in the same issue. It is most important to have dates of sowing and planting given. Without this, statements in this connection are valueless in my opinion.

Yours, etc.,

J. M. GORDON.

Sinoia,
8th January, 1917.

FINE BULAWAYO GRAPES.

To the Editor,
Rhodesia Agricultural Journal.

Sir,

I am enclosing herewith two photographs of grapes grown by me, which I think may be of interest.

The big black grapes are Barbarossa and the others White Bailey and Waltham Cross. In No. 1 photo two golf balls are shewn, to illustrate the size of the grapes; the bunches weighed from 2 to 3½ lbs. each. The two bunches shewn in No. 2 photo are White Bailey and Barbarossa, each weighing fully 3½ lbs. The two Barbarossa vines yielded 120 bunches, weighing close on 300 lbs.; 3 bunches weighed over 4 lbs. each, 12 weighed 3½ lbs. each, and the majority of the balance between 2 and 2½ lbs. each; not one bunch was under 1 lb.

All the vines are about twelve years old. Fortunately I have plenty of water, with which I supply the vines liberally. As regards culture, I may say that the vines are given well-rotted stable manure in August and again in October, and blood two or three times early in December. All bunches, as soon as the berries are well formed, are covered with special grape bags, for protection against insects and birds, and these bags are not removed till the fruit is gathered.

Yours, etc.,

J. CAMPBELL RODGER.

Bulawayo,
8th March, 1917.

Note.—We regret that the second photograph sent by Mr. Campbell Rodger was not good enough for reproduction, but the one here given will suffice to shew what fine grapes he has produced.—Ed., *R.A.J.*

Maize and Wheat Bread.

TWO RECIPES.

Mr. F. Adamson, of Freda Farm, Sinoia, has supplied the following recipe for making bread from a mixture of mealie meal and wheat flour, and we have been requested to give it publicity.

Method for 2 lb. loaf—1 lb. of sifted mealie meal; take ½ lb. and make into a stiff porridge well cooked; add the other ½ lb. of sifted mealie meal and mix; then add the yeast, to bring back to dough consistency. Add in now 1 lb. of good wheat flour, and bake in a moderately slow oven. If this is followed correctly, the crust will be quite as soft as the best flour bread, in no case hard. The porridge must be really well cooked and stiff when taken from fire.

Mr. J. H. Hampton, of the Gwebi experiment farm, kindly furnished us with the following alternative recipe, in which it will be noted the mealie meal is not previously boiled:—

Mix together 2½ teacupfuls of flour with 2 teacupfuls of maize meal. Prepare a mixture of 2 cupfuls of water to 1 of yeast (prepared as below). Pour enough of this liquid over the mixture of flour and meal to bring the dough when kneaded to the usual consistency. The dough is then left in a dish overnight and thoroughly kneaded the next morning, after which it is put in two bread tins and allowed to "rise" in the usual way. The yeast is prepared by taking 1 tablespoon each of sugar, salt and flour and mixing with a handful of hops in a dish. To this mixture add about 2 quarts of boiling water, and allow the whole to stand for about 12 hours. The liquid or yeast is then poured into bottles and corked. The sediment remaining in the dish is of no use, and can be thrown away.

The Agricultural Outlook.

The outlook is not so good as when we wrote two months ago. In February, which is normally our wettest month, the rains failed over most of the country. The main maize belt was, on the whole, more fortunate than other districts, although even there the rains were unequally distributed. A record maize crop is expected, largely owing to the great increase in the amount of land placed under that crop this year. The tobacco belt, on the other hand, has suffered severely from a variety of sets-back, and a very poor crop may be looked for. This is particularly disappointing, in view of the fact that the marketing arrangements are now on a sound basis, and planters increased their acreages in hopes of benefiting by the good prices in Europe.

From all reports, stock are everywhere in good condition, and in most districts the late rains have brought on the grass and filled the streams sufficiently to make sure of a fair carry over through winter.

Veterinary Report.

January, 1917.

AFRICAN COAST FEVER.

SALISBURY AND MAZOE DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the infected centres.

GWELO DISTRICT.—No fresh outbreaks. One animal destroyed on the infected farm Cross Roads.

MELSETTER DISTRICT.—No fresh outbreaks. The following mortality occurred at existing centres of infection:—Wolverhampton, 6 head; Cecilton, 1 head; Woodstock, 1 head; Weltevreden, 5 head; Kronstad, 1 head (suspicious).

MREWA DISTRICT.—Three fresh outbreaks occurred during the month:—(1) At Mkarakati's kraal, 1 beast died and 13 were destroyed on suspicion; the herd was moved to the Munyukwi temperature camp. (2) At the farm Exeter, 3 beasts died and 11 were destroyed on suspicion. All the cattle involved are under constant supervision, and are subjected to short-interval dippings. (3) At Chikori's kraal, 1 beast died and 2 were destroyed. These outbreaks, although somewhat disappointing, were not entirely unexpected, and they do not increase the extent of the actual area of infection. At the Munyukwi temperature camp, 2 head were destroyed as suspected of being infected.

BLACK QUARTER.

Six fresh outbreaks occurred in the Bulalima-Mangwe district. Mortality recorded to date:—144 head of cattle and 60 sheep.

TUBERCULOSIS.

The tuberculin test was applied to the herd of cattle in which a case of tuberculosis was discovered the previous month; out of 56 head, 8 shewed definite and 8 suspicious re-actions; the ophthalmic test was applied to the latter, and resulted in four positive re-actions.

CONTAGIOUS ABORTION.

One fresh centre of infection was discovered in the Marandellas district.

MALLEIN TEST.

Five horses were tested with mallein on importation, with negative results.

IMPORTATIONS.

Horses, 4; heifers, 186; bulls, 20 (including 6 from the United Kingdom); sheep and goats, 1,144; pigs, 6.

EXPORTATIONS.

Slaughter cattle to Transvaal *via* Bulawayo, 283; slaughter cattle to Transvaal *via* Liebig's Drift, 604.

February, 1917.

AFRICAN COAST FEVER.

Salisbury, Mazoe and Gwelo Districts.—No fresh outbreaks, and no cases of disease at any of the infected centres.

Mrewa District.—A fresh outbreak occurred in a small

herd of native cattle near Mrewa; 1 beast died, and the remainder, 17 head, were destroyed.

Melsetter District.—No fresh outbreaks. The following mortality occurred at existing centres of infection:—Wolverhampton, 9 head; Woodstock, 1 head; Weltevreden, 4 head; Kronstad, 1 head.

ANTHRAX.

A case of anthrax occurred on the farm Dovedale, Salisbury district; the carcase of the animal affected—an ox—was destroyed. It is suspected that the source of infection is some unsterilised bone fertiliser used for the season's crops.

BLACK QUARTER.

Twenty head of cattle died at the infected areas in the Bulalima-Mangwe and Matobo districts.

MALLEIN TEST.

Twenty-two mules were tested with mallein on importation, with negative results.

IMPORTATIONS.

Mules, 22; heifers, 256 (8 from United Kingdom); bulls, 20 (2 from United Kingdom); sheep and goats, 1,463.

EXPORT OF SLAUGHTER CATTLE TO UNION.

Via Bulawayo, 182 head; *via* Liebig's Drift, 203 head.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

April.

BEE-KEEPING.

Where numbers of the bee-louse are seen attaching themselves to the legs of bees and also among the quilts which cover the frames, this pest can be controlled by crushing them with the finger. In the cooler districts, crates that are partially filled with honey should be removed, and into the lift which they occupied plenty of warm clothing should be snugly packed.

CITRUS FRUITS.

During the early part of this month autumn budding can still be performed if sap is still up; in fact, if the season is late this operation is better done a little late than early, as in the event of late rains occurring, followed by a warm spell, the buds are liable to start growing, but are soon checked, the result of which is usually a stunted tree. Water by irrigation should be supplied to bearing orchards, unless unusual soaking rains have fallen late in season, followed by thorough cultivation and hoeing around trees. Continual watch must still be maintained for fruit-eating and codling moths. Spraying or fumigating against insect or other pests should not be neglected. Some early varieties may be expected to be ripening towards the end of this month.

CROPS.

The rains are practically over by this month, and the harvesting of early crops, such as buckwheat, linseed, teff grass and manna, will commence. The silo pit should be got ready, and the making of ensilage should be undertaken during this month. Napier's fodder can now be cut for this purpose. Veld hay for feeding should not be cut later than the end of this month. All lands that are available should be ploughed. The preparation of vleis for winter crops should be continued, and late crops, such as Algerian oats, should be sown this month; also barley for an early green crop.

DECIDUOUS FRUITS.

Orders should be given to the nurseryman for trees required in August, September or October. Trees will be lifted in August, and may with advantage be kept in cool storage till required.

ENTOMOLOGICAL.

Maize.—"Earworms" are sometimes troublesome in the tassels and ends of the cobs, but this pest cannot be directly attacked. Caterpillars may attack the crop, on account of their food being suddenly destroyed by late cultivation after the weeds have been allowed to get too far ahead.

Tobacco.—Any remaining plants shewing stem borer attack should be removed and burnt.

Potatoes.—Should be systematically cultivated and hilled, to keep tuber moth from tubers.

Cabbage Family.—Plants of this family are liable to suffer severely from cabbage louse and Bagrada bug.

Beans and Cowpeas.—Insect attack on these plants is but little obvious during April.

Dhal.—Suffers much from blister beetles destroying the blossom during April. Hand picking is the only remedy.

Citrus Trees.—Collect and destroy infested fruit, to keep down citrus codling.

FLOWER GARDEN.

Sow sweet peas. Hardy annuals, such as candytuft, cornflower, eschscholtzia, gypsophilla, larkspur, mignonette, poppy, etc., may be sown in the open ground, and should not be transplanted. Perennials may be sown in boxes.

FORESTRY.

Prick out into tins the young trees raised from the seed sown in February. Any breaking up left over from last month should be completed this month; also any fire lines left unploughed.

POULTRY.

Adult stock should have completed the moult by now, and may be put on a laying ration. Breeding pens should be mated up. If pullets are used in the pens they should be mated with a two-year-old male bird. Any birds which have not completed the moult should not be used in the pens. Do not breed from all and sundry. Carefully select your breeding stock, and handle each bird. Discard all with crooked breast-bones, wry-tails, in-knees, crooked toes or other serious defects. Select as many as possible that have already started to lay. Remember the male bird is more than half the pen. Above all, do not give your breeding birds a forcing laying food; it is not the quantity of eggs you should look for, but the quality. Spring hatched birds from Australia may now be imported.

STOCK.

Cattle.—Cattle on the ranch should require little attention beyond dipping. Bulls should be kept out of the herd if January calves are not desired. Dairy cattle will require a ration of crushed or ground maize and some succulent food, such as green maize stalks. Napier's fodder or ensilage, if any of the latter has been left over from last year. Calves should be supplied with green fodder and a ration of maize meal, together with some more nitrogenous food, such as bean meal, pea meal, buckwheat meal, or linseed meal. Care should be taken to provide supplementary food to all cattle before they lose any appreciable amount of flesh, in order that mid-winter may not find them in poor condition. All preparations for making ensilage should be completed by the beginning of the month. Any haymaking still undone should be attended to without delay, weather permitting. Attention should be given to water supplies for winter, and arrangements made to prevent water holes, etc., being trodden in as the supply shortens.

Sheep.—If grass seeds are troublesome, an area should be mown for grazing. Sheep should not be allowed to graze in the vleis. If the ram is put in now, lambs will be born in September, which may be considered somewhat early by some breeders.

TOBACCO.

Tobacco curing should be completed this month.

VEGETABLE GARDEN.

Potatoes require ridging and tomatoes staking and tying up. Potatoes which mature after the rains may generally remain in the soil and be lifted as required. Vegetables planted out for winter crops should be well and continuously cultivated, which will bring them along quicker, with less watering. Beans and peas should be staked and tied. Beans, carrots,

cabbage, cauliflower, peas, turnip, spinach, beet and radish should be sown for late winter crops.

VETERINARY.

Horse-sickness will be prevalent this month, as will blue tongue in sheep. The first symptom is laminitis, the second a protruding blue tongue.

WEATHER.

Along the higher ridges of the country we may still look for an inch of rain, more or less, during the month, though little, if any, can be expected in the Zambesi and Limpopo valleys and all low-lying parts of the country. As often as not, however, April is a dry month. In past years it has occasionally happened that early frosts have been recorded which put an end to the tobacco harvest, and may kill tender vegetables and flowers; but, as a rule, no such calamity need yet be expected, and if at all, only in frosty hollows.

May.

BEE-KEEPING.

The scarce supply of nectar, due to conditions of drought, will be responsible for a deficiency of stores. Where this is noticed, steps must at once be taken to supply the bees with artificial food in the shape of syrup. A feeder must be placed above the frames inside the hive. Never feed bees outside, as it promotes robbing.

CITRUS FRUITS.

Continue irrigating bearing orchards up to within three weeks of picking fruit, followed by cultivation and hand hoeing. The same remarks as in April apply concerning insect pests, etc. Washington Navel oranges will be ripening this month, and possibly some early ripening seedlings.

CROPS.

Crops such as summer wheat will be ready for harvesting. Majorda melons should be carted to some convenient spot, but not heaped. Ploughing should be continued on all available lands. Winter crops in vleis, such as Early Gluyas and other wheats, New Zealand oats and barley, should all be sown not later than this month. Napier's fodder may still be cut for ensilage during this month. This will give time for a considerable after-growth, which can serve as winter pasture.

ENTOMOLOGICAL.

Cabbage Family.—Plants of this family are liable to suffer greatly from cabbage louse and Bagrada bug during May. For the former, spray with soap and tobacco wash, which may help if the plants are not too big.

Dhal.—Blister beetles are still injurious to the blossom of the crop, and should be regularly collected and destroyed.

Citrus Trees.—Continue to collect and destroy all fruits infested wi' citrus codling.

Guava.—Fruit fly and citrus codling breed in these fruits during the autumn and winter.

FLOWER GARDEN.

Sow *in situ* cornflower, larkspur, mignonette, poppy; sweet peas may also be planted.

FORESTRY.

Complete pricking out into tins. Strike cuttings of species that are propagated in this manner, such as poplars. If it is intended to use the saltpetre method of eradicating stumps, the trees should be felled this month.

POULTRY.

If the means of incubation is limited, hatch the heavy breeds first, as they take longer to mature. Hatch as early as possible, to get your birds well grown before the rains, as they will make very much better development during the dry months. Do not breed from turkeys till they are fully matured. Two-year-old hens and a three-year-old male bird will be found to give the most satisfactory results. Very heavy male birds should not be used. As is the case with fowls, in breeding for size, we get this from the hens, which should be large and possessing straight keels. Get the turkeys on to lay as soon as possible. Eight or nine-month-old birds are the best for market purposes.

STOCK.

Cattle.—Ranching cattle may still be expected to be in good condition. Dairy cattle should be treated much the same as is recommended for April, but the ration should be increased somewhat, especially the succulent portion. Grass may still be cut for bedding, and both cows and calves should be well bedded down at night from now onwards. Maize will probably be in fit state for making into ensilage, and towards the end of the month maize hay may be made after the removal of the cobs. The vines of monkey nuts when reaped should be carefully preserved for fodder. Cowsheds should be put in good repair against the cold winter nights.

Sheep.—The vleis having dried, sheep will probably do better in the lower lying lands. If the ram is put in now, lambs will be born in October, which is usually a good month to arrange for. Those who favour winter lambs, and have ewes lambing now, will find a few handfuls of maize a great help to the ewes in providing milk.

TOBACCO.

Tobacco will be sent to the warehouse this month. The work of preparing the land for the next crop should now be taken in hand. The stalks of the old crop should be taken out and burnt.

VEGETABLE GARDEN.

Sow broad beans, peas, lettuce, spinach, parsnips, carrots, radish and beet. Constant cultivation is necessary.

VETERINARY.

Horse-sickness will still be in evidence, and may be expected to continue until the frosts occur. Inoculation for blue tongue should be performed in the dry season only, unless the animals can be kept under cover for 21 days. Do not inoculate ewes in lamb on account of abortion. Inoculated animals spread the disease for 21 days. Scab is a poverty winter disease.

WEATHER.

The dry season should have now set in, though averages of from a quarter of an inch to three-quarters are indicated in the official reports. Ground frosts at night have been recorded, but are very unusual.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1917	January	—	—	—	—
1917	February	7·73	0·39	0·11	0·28

TEMPERATURES.

Station	January		February	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
Mashonaland—				
Charter—				
Enkeldoorn	84·2	53·5	86·5	53·4
Hartley—				
Gatooma	89·1	58·1	91·0	51·0
Hallingbury Farm	83·3	60·3	80·1	59·0
Hartley Hospital	85·4	61·1	88·1	59·8
Idaho Farm	84·1	59·2	—	—
Lomagundi—				
Eldorado Mine	79·66	62·79	80·84	61·18
Kanyemba	—	—	—	—
Sinoia	83·8	75·4	85·6	73·5
Sipolilo	81·4	61·8	82·9	61·4
Makoni—				
York Farm	—	—	—	—
Mangwendi—				
Kwenda Hospital	75·5	66·9	77·9	64·1
Mazoe—				
Shamva Mine	—	—	—	—
Melsetter—				
Melsetter	74·5	56·8	76·2	54·6
Mount Selinda	75·9	60·0	76·4	59·7
Vermont	82·1	61·2	80·9	61·5
Salisbury—				
Chishawasha	79·4	60·0	81·8	58·8
Salisbury (Gaol)	82·7	58·5	85·9	58·6
Umtali—				
Chiconga's Location ...	83·6	61·9	—	—
Public School	83·5	62·8	84·9	61·5
Summerfield	68·5	64·6	70·8	63·4
Victoria—				
Eythorne	86·1	57·9	86·1	57·7
Morgenster	77·9	59·1	—	—
Victoria	80·23	60·19	82·69	59·35

TEMPERATURES—*(Continued).*

Station	January		February	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	85·2	60·9	87·9	60·2
Garth	85·8	59·6	84·9	60·2
Plumtree School	83·5	—	84·9	—
The Retreat	92·5	—	92·5	—
Bulawayo—				
Observatory	—	—	—	—
Gwanda—				
Antelope Mine	87·22	64·5	86·7	64·07
Mazunga	92·2	65·6	91·7	63·6
Tuli	93·4	67·96	91·6	67·2
Gwelo—				
Gwelo (Gaol)	82·8	49·2	87·5	48·5
Hagley (Iron Mine Hill) ...	—	—	—	—
Matobo—				
Holly's Hope	87·3	61·7	86·8	61·5
Rhodes Matopo Park ...	85·3	59·2	85·8	59·3
Umzingwane—				
Essexvale	82·2	60·6	83·42	59·92
Hope Fountain	—	—	—	—
Wankie—				
Victoria Falls	88·7	50·3	84·7	51·3
Wankie (Hospital)	93·5	68·9	82·0	68·0

RAINFALL.

Station	January	February
MASHONALAND—		
Charter—		
Buhera	4·36	0·24
Bushy Park	2·23	0·51
Enkeldoorn Gaol	1·98	0·65
Marshbrook	1·90	0·65
Range	—	0·87
Riversdale	2·07	0·68
Umniati	—	0·54
Vrede	1·17	0·39
Wylde Grove	1·61	—
Chibi—		
Chibi	1·16	0·66
Nuanetsi Ranche	2·78	0·86
Chilimanzi—		
Central Estates	—	0·78
Chilimanzi	3·37	1·12
Driefontein	3·50	1·47
Induna Farm	—	0·93

RAINFALL—*(Continued).*

Station	January	February
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	—	0·32
Umvuma (Railway)	2·22	0·56
Darwin—		
Mount Darwin	9·74	2·26
Gutu—		
Chingombe	3·55	Nil
Eagle's Nest Ranche	—	0·15
Gokomere	—	0·41
Gutu	6·49	3·57
Hartley—		
Ardgowan	3·35	0·43
Auchter Leny	1·99	1·02
Battlefields (Railway)	1·25	2·85
Carnock Farm	3·75	1·07
Clifton Farm	—	—
Elephant Hill, Battlefields	—	—
Elvington	1·82	0·18
Gadzema (Railway)	3·17	3·46
Garthnor	3·27	1·72
Gatooma	1·98	1·33
Gatooma (Railway)	2·02	0·92
Gowerlands	3·93	1·82
Hallingbury Farm	2·13	1·20
Hartley Hospital	2·79	2·13
Hartley (Railway)	2·16	1·99
Hopewell	2·73	1·74
Idaho Farm	4·37	—
"Jenkinstown"	2·85	1·24
Makwiro (Railway)	4·75	1·21
Philiphaugh	5·19	1·17
Shagari	2·61	2·44
Spitzkop	—	—
"Stoneygate"	2·18	—
Inyanga—		
Inyanga	—	2·49
St. Trias' Hill	2·57	1·60
Lomagundi—		
Argyle	8·83	2·67
Banket Junction (Railway)	5·68	4·34
Darwendale	—	2·23
Duxbury Farm	6 11	4·65
Eldorado Mine	4·87	—
Eldorado (Railway)	4·55	5·82
Golden Kopje Mine	—	5·23
Lion's Den	—	3·04
Lone Cow Estate	7·82	4·73
Longmead	10·11	4·10
Maningwa	—	3·84
Palm Tree Farm	5·03	3·17
Sinoia	—	—
Sinoia (Railway)	8·55	4·62
Sipolilo	7·41	6·04
Umvukwe Ranche	—	—

RAINFALL—(*Continued*).

Station	January	February
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	3·76	0·64
Chimbi Source	6·33	2·01
Delta	5·98	1·25
Eagle's Nest	6·56	3·07
Ellavale	—	—
Gorubi Springs	1·59	—
Headlands (Railway)	6·20	2·57
Mona	6·49	0·45
Monte Cassino Mission	7·36	1·55
Odzi (Railway)	7·76	1·57
Rusape (Railway)	6·81	1·24
Springs	8·68	1·03
York Farm	—	—
Mangwendi—		
Bonongwe...	4·09	0·52
Huish Estate	4·48	0·72
Kwenda Mission	4·09	1·34
Land Settlement Farm	6·13	0·64
Macheke (Railway)	10·21	2·08
Marandellas	7·66	2·76
Marandellas (Railway)	7·58	3·26
Nelson	4·90	0·02
Selous Nek	6·96	2·51
Theydon	6·72	Nil
Tweedjan	—	0·57
Verdoy	—	—
Mazoe—		
Avonduur	—	2·86
Bindura	—	3·11
Bindura (Railway)	6·52	1·78
Ceres	6·58	2·27
Chipoli	7·31	1·29
Citrus Estate	5·93	2·48
Dunmaglas	5·41	—
Jumbo (Railway)	8·99	3·20
Kilmer	6·06	4·78
Kingston	7·64	3·71
Laguaha	—	3·89
Lowdale	5·01	2·12
Mazoe	7·31	1·88
Mguta Valley	—	—
Omeath	10·08	6·60
Protea Farm	—	—
Ruia	10·47	4·93
Ruoko Ranche	7·98	7·73
Shamva	—	4·39
,, Mine	—	—
Stanley Kop	5·00	2·63
Sunnyside	—	2·57
Teign	6·74	4·15
Virginia	—	3·16
Volynia Ranche	9·70	1·23

RAINFALL *(Continued)*.

Station	January	February
MASHONALAND—(Continued)		
Mrewa—		
Glen Somerset	5·38	2·09
Mrewa	6·31	2·98
Mtoko—		
Makaha	—	0·56
Mtoko	6·84	0·70
Melsetter—		
Brackenburg	14·33	1·53
Chikore	6·20	4·32
Chipinga	7·50	4·24
Helvetia	17·81	5·46
Melsetter	8·69	3·53
Mount Selinda	11·02	6·24
Mutambara Mission	7·56	0·41
Pasture	5·63	1·01
Tom's Hope	11·79	4·15
Vermont	17·35	5·33
Ndanga—		
Bikita	12·97	3·41
Chiredzi Ranche	3·40	1·35
Marah Ranche	—	0·64
Ndanga	6·14	1·94
Pamushana	5·61	—
Salisbury—		
Ardbennie	3·74	—
Avondale	4·34	1·84
Botanical Experiment Station	3·91	1·20
Bromley	5·27	1·31
Brookmead	—	—
Borrowdale (Hatcliffe)	5·71	2·82
Chishawasha	6·40	3·65
Cleveland Reservoir	3·90	1·96
Ewanrigg	6·90	1·06
Forest Nursery	4·51	0·35
Glenara	4·95	3·07
Goromonzi	8·03	1·12
Gwebi	5·50	1·51
Hillside	4·50	1·04
Lilfordia	3·88	2·53
Salisbury (Gaol)	3·12	0·84
,, (Railway)	3·80	—
Sebastopol	3·87	0·56
Selby	4·55	2·28
Stapleford	7·67	2·86
Sunnyside	4·01	1·86
The Meadows	6·76	1·42
Vamona	6·01	2·32
Westridge	3·45	—
Umtali—		
Chiconga's Location	5·09	—
Odzani	5·39	1·69
Penhalonga	6·49	4·09
Premier Estate	5·48	2·19
Public School	5·43	3·48

RAINFALL *(Continued).*

Station	January	February
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	8·31	1·97
Stralsrund	8·70	0·70
Summerfield	5·43	1·94
Umtali (Railway)	5·81	—
Utopia	5·82	—
Urungwe—		
Nassau Estate	—	6·19
Victoria—		
Brucehame	1·60	0·37
Clipsham	2·40	0·35
Empress Mine	1·74	0·31
Eythorne	3·57	0·57
Fairburn	3·66	1·43
Fort Victoria (Railway)	3·23	—
Marthadale	—	—
Makorsi River Ranche	4·24	0·51
Morgenster	5·43	0·39
Silver Oaks	2·76	0·41
Victoria	3·26	0·22
MATABELELAND :		
Belingwe—		
Tamba	1·62	0·62
Wedza	3·99	0·27
Bubi—		
Bembesi (Railway)	2·29	2·94
Imbesu Kraal	1·69	0·73
Inyati	—	3·90
Maxim Hill	2·23	1·76
Shangani Estates	—	0·94
Bulalima-Mangwe—		
Empandeni	2·47	3·80
Garth	2·13	6·20
Mholi (late Magot)	3·64	3·61
Plumtree School	3·34	3·40
The Retreat	4·81	4·81
Riverbank Farm	1·96	6·42
Solusi Mission	0·94	5·32
Syringa	3·61	4·08
Tegwani	—	—
Tjompanie	2·10	3·57
Bulawayo—		
Government House	2·27	0·73
Keendale	—	1·22
Khami	—	0·83
Lower Rangemoor	—	1·57
Observatory	—	—
Raylton (Railway)	2·04	0·92
Umgusa	1·92	1·16
Umkien	—	—
Gwanda—		
Antelope Mine	1·28	3·32
Gwanda (Gaol)	2 79	1·70

RAINFALL *(Continued)*

Station	January	February
MATABELELAND—(Continued)		
Gwanda—continued		
Gwanda (Railway)	2·78	1·69
Lamulas	3·59	0·87
Langalanga	2·35	3·93
Makalali	2·14	0·82
Manantji	1·32	0·90
Mapande	1·57	1·25
Mazunga	1·51	1·60
Mtshabzi Mission	2·32	5·38
Tuli	2·11	0·42
West Nicholson (Railway)	2·21	0·55
Gwelo—		
Daisyfield	0·81	0·67
Dawn	0·66	1·59
Globe and Phœnix Mine	—	1·27
Globe and Phœnix (Railway)	1·30	1·11
Gwelo (Gaol)	2·95	0·53
Gwelo (Railway)	2·96	0·48
Hagley	—	—
Hunter's Road	—	0·56
Indiva Farm	—	—
Lalapanzi (Railway)	3·59	0·16
Lovers' Walk	—	0·95
Lower Gwelo	—	0·88
Oaklands	—	1·01
Que Que	—	—
Rhodesdale Estate	1·64	0·62
Sikombela Farm	3·08	2·30
Troy	—	—
Woodendhove	3·74	0·39
Insiza—		
Albany	2·09	—
Anglo-French Block	—	—
Filabusi	1·69	2·10
Fort Rixon	1·69	1·89
Infiningwe	—	3·25
Insiza (Railway)	1·86	2·01
Inyezi Farm	1·24	1·01
Orangevale	1·74	0·87
Roodeheuvel	2·80	1·53
Scaleby	—	—
Shangani (Railway)	1·07	1·52
Thornville	1·79	1·38
Matobo—		
Holly's Hope	2·24	3·33
Matopo Mission	1·67	3·73
Rhodes Matopo Park	1·18	1·27
Nyamandhlovu—		
Gwaai (Railway)	1·89	1·81
Edwaleni	2·21	2·57
Impondemi	—	—
Melinakanda Junction	—	—
Naseby Farm	1·10	3·10
Nyamandhlovu (Railway)	2·28	3·74

RAINFALL *(Continued)*.

Station	January	February
MATABELELAND—(Continued)		
Sebungwe—		
Gokwe	3·80	1·57
Inyoka	1·61	—
Selukwe—		
Hillingdon	2·33	0·59
Selukwe (Railway)	6·63	0·90
Tokwe River Ranche	3·48	1·54
Umzingwane—		
Balla Balla (Railway)	2·56	3·63
Crombie's	—	3·43
Essexvale	2·68	1·37
Heany Junction (Railway)	1·67	2·86
Hope Fountain	—	—
Springs Farm	1·69	2·51
Wankie—		
Bombusi	—	3·88
Malindi (Railway)	—	—
Victoria Falls	0·89	5·15
Victoria Falls (Railway)	0·80	4·30
Wankie Hospital	2·02	3·21
Wankie (Railway)	2·40	4·23

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917		
			April	May	June
Beatrice Road	Various farmhouses	H. W. Harris	11	9	13
Bembesi	Queen's Mine Hotel	V. C. Andrews	6	4	1
Bindura	Bindura	C. J. Glen	14	12	9
Bromley	Bromley	A. A. Draper	5	3	7
Charter—Mgezi	Beatrice Mine	W. Krienke	25	30	27
Central	Umvuma	— James	28	26	30
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	13	11	8
Enterprise	Arcturus Hotel	J. G. M. Bernard	4	2	6
Felixburg	Felixburg	R. H. Brown	14	12	9
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	7	..	2
Gatooma	Gatooma	T. J. Golding	21	19	16
Gazaland	Chipinga	W. Wood	28	26	30
Greystone	Roodeheuvel Farm, Shangani	J. W. Spencer	14	12	9
Hartley	Hartley	J. de L. Nimmo	..	..	..
Headlands	Headlands	J. M. Harvard	28	..	30
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	14	12	9
Insiza—Shangani	Shangani	T. E. Penny	..	..	2
Inyazura	Inyazura	A. C. Curling	18	16	20
Iron Mine Hill	Iron Mine Hill	T. Irving	14	12	9
Lalapanzi	Lalapanzi	N. A. Bradford	21	19	16
Lomagundi	Sinoia	A. H. Layard	21	19	16
Lydiate	Norton	W. Wrench	28	26	30
Macheke	Macheke	J. Cheyne		No fixed dates	
Makwiro	Makwiro	C. D. Voigt	20	18	15
Marandellas and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	7	5	2
Makoni	Rusape	H. Barnes Pope	7	5	2
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	4	2	6
Matopo Branch, R.L. and F.A.	Sibali	———	..	9	..
Mazoe	Glendale Siding	A. G. McCall	11	9	6
Melsetter (North)	Various farms	Rev. R. Wodehouse	..	..	2
Midlands	Gwelo	Harry Payne	13	11	8
Northern Umtali	Farm "Summerfield"	R. O. H. Blurton	..	5	..
Norton and District	Norton Siding	———	7	5	2
Que Que	Que Que	E. J. Ross	21	19	16
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	27	25	29
Shamva	Shamva	Wm. Scott	..	16	..
Selukwe	Selukwe	F. S. Clark		No fixed dates	
Somabula and Shangani Flats	Weltevrede School	G. B. Botha	..	12	..
Umvukwe	Various ranches	S. A. S. Colborne	14	12	9
Umtali	Christmas Pass Hotel	J. S. Holland	7	5	2
Victoria	Victoria	John Rennie	6	4	1
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	14	12	9

Departmental Notices.

Information for Farmers

The Department of Agriculture is prepared to furnish to farmers technical advice either by correspondence, or, where possible, by personal visits. All communications should be addressed in the first instance to the Director of Agriculture.

Crops

The Agricultural Branch deals with enquiries relating to agricultural practice, soils, crops, cultural operations, processes, seeds, trees, farm implements and machinery, etc.

Disposal of Pure Seed.

Farmers devoting special attention to the production of pure seed of any locally grown crops are invited to communicate with the Government Agriculturist, and at the same time to submit a ¼ lb. sample of any seed which they may have for disposal.

In addition to indicating the total amount of seed offered and the price f.o.r. the nearest railway station or siding, the correct name of the variety and the origin of the seed from which the crop was grown should be given. In the case of special attention having been devoted to seed selection, the methods employed should be described..

Where these stipulations are complied with, and the samples forwarded are deemed by the Agriculturist of sufficiently high quality for seed purposes, growers and intending purchasers will be put in touch with one another. It is hoped by this means to encourage the production of pure seed, and growers are urged whenever possible to sell their seed under guarantee of trueness to name, type and sample deposited with the Department.

After placing growers and would-be purchasers in touch with one another, the Department can accept no further responsibility except in the position of adjudicator when bulk supplies are thought inferior to sample and description, in which case both parties will be required to abide by the decision of the Department.

For further particulars see article on Pure Seed Supply, *Rhodesia Agricultural Journal*, February, 1914.

Poisonous Plants

It is of great importance that as soon as possible a study should be made of those plants found in Southern Rhodesia which are poisonous or deleterious to small or large stock. Farmers and others who have known, or suspected poisonous plants on their property, are requested to communicate with the Government Agriculturist and Botanist, Department of Agriculture, Salisbury, at the same time forwarding specimens of the plant, including stem, leaves, flowers, and, where possible, fruit. Any particular regarding the habits of the plant will be welcomed, and in return the Department will supply all available information regarding the plants.

Live Stock

The Animal Industry Branch is prepared to advise with regard to all matters connected with stock breeding, selection, feeding and registration of stud animals, the dairy industry, poultry management, farm buildings for stock, and kindred subjects. Buyers and sellers of stud stock in Rhodesia are also put in touch with one another.

Entomology

The Government Entomologist advises on matters connected with insect pests of live stock, crops, and fruit trees, and also undertakes the inspection of nurseries and of the importation of plants from abroad.

Chemical Analyses

The Government Agricultural Chemist deals with matters relating to the composition of soils, fertilisers, farm produce of vegetable or animal origin; also the investigation of poisons and of articles of potential economic value.

Nominal charges are made, which, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

A schedule of charges and directions for taking samples will be furnished on application.

With all analyses, reports will be furnished explanatory of the results and, when possible, advice given as to the nature, properties and value of the material.

No charge will be made for analysis where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Citrus Culture

The Government Citrus Adviser advises on all matters connected with the citrus and deciduous fruit industry.

Services of Government Veterinary Surgeons

1. The services of Government Veterinary Surgeons are available to the public, free of charge, for the following purposes only :—

(1) Attending and giving professional advice in connection with the following diseases, viz. :—Anthrax, Contagious abortion, East Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Foot-rot, Heartwater, Glanders, Intestinal parasites amongst sheep and goats, Liver Disease, Lungsickness, Osteo Porosis, Malarial Catarrhal Fever (blue tongue), Rabies, Redwater, Rinder-

pest, Scabies, Sponziekte (quarter evil), Swine Fever, and any other diseases which may in future be scheduled in terms of section 3, sub-section 18 of the "Animals Diseases Consolidation Ordinance, 1906." Attending to cases of disease amongst live stock which, though not of a contagious or infectious character, may be of general public importance.

(2) Applying tests in regard to Glanders, Tuberculosis, or any other disease against the introduction or spread of which tests are applied under regulations.

(3) Inoculations against the following diseases :—

Horsesickness, Lungsickness, Anthrax, Quarter Evil, Redwater, Malarial Catarrhal Fever (blue tongue). A fee to cover the cost of serum and virus will be charged.

2. The following charges shall be made and payable for services rendered by the Government Veterinary Surgeons in other cases, viz. :—

	£	s.	d.
(1) For every professional visit within three miles of his office or residence	0	5	0
(2) For every professional visit beyond such distance	0	10	6
plus an additional charge of 2/6 per hour whilst engaged in such visits or £2/2/0 a day of 24 hours;			
(3) For advice given at the Veterinary Surgeon's office, for each animal, per visit	0	2	6
(4) The following to be charged in addition to visiting fees :—			
a. For every examination as to soundness, each	1	1	0
b. For castration, horses, each	1	1	0
c. For castration, bulls, each	0	5	0
d. For castration, donkeys, each.. ...	0	10	6
e. For parturition cases, mares, each	2	2	0
f. For parturition cases, cows, each..	1	1	0
g. For other operations, according to nature, from 5/- to £2/2/0.			

3. Double the above fees will be payable for services rendered on Sundays, public holidays, and between the hours of 7 p.m. and 7 a.m.

4. Applicants for the services of Government Veterinary Surgeons must at their own cost provide the necessary transport for the conveyance of these officers from, and back to, their residence or nearest railway station.

5. Farmers and owners of stock throughout the country frequently telegraph for a Government Veterinary Surgeon to be sent to attend an animal which has been taken seriously ill. It is rarely possible to comply with these requests at once, as the Veterinary Surgeon may be engaged on duty which he cannot leave, or is at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the veterinary staff discredited. To obviate this, in all cases where veterinary advice and assistance are required, the owner should telegraph to "Veteran," Salisbury, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This will enable the Chief Veterinary Surgeon to telegraph advice at once and state whether he is able to arrange for veterinary attendance on the case or not, and save valuable time, which is always of importance in acute cases.

6. The services of Government Veterinary Surgeons will only be available for private work with the consent of such officers, and when such work does not interfere with their official duties, or when the services of a private practitioner are not available.

7. As the arrangement of allowing Government Veterinary Surgeons to attend to private cases is intended purely for the benefit of farmers and stock-owners who may wish to obtain professional advice, no responsibility whatever will be accepted for any loss of stock, etc., which may result from the negligent treatment or advice, or wilful default, of any Government Veterinary Surgeon.

8. All fees collected in terms of these Regulations are payable to the Treasury through the local Receiver of Revenue.

Irrigation

From the Agricultural Engineer assistance may be obtained by farmers for the following :—

1. In the locating of possible irrigation projects.
2. In the preparation of surveys or plans and for irrigation works, including weirs, dams, furrows, pumping plants, and determining the extent of land which may be brought under irrigation schemes, together with rough estimates of costs.
3. In the supervision of construction and carrying out of projects.
4. In the selection of suitable sites for boring operations.
5. Preparing specifications, etc., regarding pumping plants, windmills, and agricultural machinery.
6. Giving general advice on cognate subjects.

Informal advice of a general character will be given to applicants making enquiry by letter or in person. Any applicant desiring professional assistance likely to occupy more than one day should apply for advice in writing. All applicants should specify clearly the nature of the project on which they seek advice, and should give full particulars as to the distance and direction of their farms from some well-known centre. Applicants will be required to provide suitable means of transport for the officer concerned during the period devoted to work on the spot; to provide any unskilled labour that may be required; and to provide for any other contingent services. Applications should be addressed to the Director of Agriculture, who will endeavour to arrange visits as far as possible in order of application, but with due regard to situation, in order to obviate unnecessary travelling and delay. The services of the Agricultural Engineer are given free, but in cases demanding prolonged individual attention, or repeated supervision, a charge may be made according to circumstances.

Samples

In connection with enquiries, especially with regard to diseases amongst crops, insect pests, soils, grain and the identification of plants, specimens should, wherever possible, be

sent, together with full details. It is found that such parcels are often forwarded without any indication of where they are from or why they were sent and it is difficult in such cases to trace the sender. It is, therefore, requested that persons when forwarding samples for examination, indicate clearly their names and addresses on the packages, so as to enable their requirements to be attended to without delay.

The Analysis of Agricultural Products, Soils, Water, etc.

SCALE OF CHARGES.

Arrangements have now been made for the chemical examination of soils, grain, and other produce, oil-seeds, milk, water, fertilisers, etc., on behalf of farmers and others by the Chemist attached to the Department of Agriculture. The charges made, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject, should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

Schedule of Charges.	£	s.	d.
1. Partial analysis of a manure or feeding stuff, for each constituent	0	5	0
2. Complete analysis and valuation of a manure or feeding stuff	1	0	0
3. Analysis of agricultural products, *e.g.*, grain, hay, roots, etc.	1	0	0
4. Analysis of water for agricultural purposes, irrigation or drainage	1	5	0
5. Partial analysis of soil to determine fertility and recommendations as to manurial treatment	2	0	0
6. Complete analysis of a soil	3	0	0
7. Milk—determination of total fat and solids ...	0	5	0
do. do. of fat only	0	2	6
do. complete analysis	0	10	0
8. Cream—determination of fat only	0	2	6
do. complete analysis	0	10	0

	£	s.	d.
9. Analysis of cheese	0	10	0
10. Limestone—estimation of percentage of lime	0	5	0
do. complete analysis	1	0	0

Remittances should accompany samples submitted.

No charge will be made where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Directions for Taking Samples of Soils.

It is recommended to select four or five spots at least, per acre, taking care that these represent as far as possible the general character of the soil of the field. If the soil of the area to be reported upon presents notable differences, the samples gathered from the different parts must be kept separate.

Having selected a proper spot, pull up the plants growing upon it and remove surface accumulations of decaying leaves, etc., if any. Dig a hole about twelve inches deep and trim one side so as to be smooth and vertical; from the side so prepared remove with the aid of a sharp spade a slice of uniform thickness—about three or four inches—down to a depth of nine inches. Place the slice on a clean board or cloth and mix thoroughly with similar slices obtained in the same way from other parts of the field area. About six pounds of the mixture are then placed in a clean cloth bag or wooden box. Forward with the sample the following particulars:—

Date of collection, exact location, position (hillside, vlei or flat), peculiarities of soil or sub-soil, behaviour in wet and dry seasons, crops borne, previous manurial treatment, and every circumstance in fact which will throw light on its agricultural qualities.

Directions for Taking Samples of Grains, Produce and Feeding Stuffs.

Grains, meal and feeding stuffs and all agricultural produce should be sampled in the same manner as prescribed for fertilisers.

When the feeding stuff is in the state of cake, select not less than three cakes where the quantity does not exceed one

ton, not less than five cakes when the quantity does not exceed five tons, and not less than ten cakes when the quantity exceeds five tons.

Break the selected cakes into small pieces, mix them together, and take the sample—not less than one pound—from the mixture.

Directions for Taking Samples of Fertilisers.

If delivered in bags, select not less than two bags when the quantity does not exceed one ton, and one additional bag for every additional ton.

In no case need more than ten bags be selected.

Empty the selected bags separately on to a clean wooden or stone floor. Thoroughly mix the contents, and set aside one spadeful from each bag, mix together the separate spadefuls, and from the mixture take about one pound as a sample.

If the fertiliser is in bulk, mix together portions taken from the different parts, and draw the sample from the mixture.

Directions for Taking Samples of Water.

All samples should be sent in glass bottles. Stoneware jars are to be avoided. The bottles should preferably be provided with glass stoppers; if corks are used, they must be new and well washed previously in pure water.

In sampling a stream or tank, before taking the samples rinse out the bottle several times with water, taking care to avoid the introduction of mud or sediment.

Before taking a sample of water from a pipe, allow the water to run through it for a few minutes at full pressure.

In all cases, before the sample is taken, always rinse out the bottle several times with the water to be sampled.

Quantity to be taken: 1 gallon.

Directions for Taking Samples of Milk and Cream for Butter-Fat Determinations.

The bulk from which the sample is to be drawn should be first poured two or three times from one vessel to another, and about half-a-pint forwarded for examination.

If it is impossible to deliver the sample in a fresh condition, introduce into each sample bottle about as much of the following preservatives as can be held upon a threepenny piece:—Borax, boric acid or salicylic acid; stating which preservative has been used.

All bottles used must have been previously cleansed with boiling water.

Charges for Dipping Cattle at Government Dipping Tanks.

A charge of 1d. per head is made in respect of all cattle dipped at Government dipping tanks.

Unweaned calves will be dipped free of charge.

Payment may be made in cash or by means of books of coupons at £1, 10/- and 2/6, which can be obtained from Civil Commissioners, Native Commissioners, or through all Veterinary Surgeons and Cattle Inspectors.

The tanks to which these provisions at present apply are the following :—

Salisbury (3), Bulawayo (3), Inyati, Umtali, Penhalonga, Melsetter, Marandellas, Macheke, Mazoe, Lomagundi, Hartley, Gwelo, Selukwe, Enkeldoorn, Victoria, Gwanda, Gatooma, Que Que, Umvuma, Kimberley Reefs.

Lectures for Farmers

The services of certain of the officers of the Department of Agriculture and the Veterinary Department are available for purposes of delivering lectures on subjects upon which they have special knowledge. As far as practicable, lectures will be accompanied by demonstrations at the time or subsequently in the field. Owing to the many calls on the time of the staff and the exigencies of their duties, alternative dates are desirable in order to avoid disappointment. The following topics are offered as examples of subjects that may be dealt with in this manner, but the suggestion of other themes is invited.

Agriculture.—Maize growing; Maize selection and maintenance of the breeding plot; Points of maize and maize judging, with demonstrations; Utilisation of granite vlei soils; Ground nut culture; Rotation crops for home use and for sale; Veld improvement by winter grasses; Production of foodstuffs for the mines; Ensilage; Fungoid diseases of maize and wheat; Wheat, oats and lucerne under irrigation; The prospects of cotton culture in Southern Rhodesia.

Veterinary Hygiene.—Detection and prevention of disease; The care of live stock.

Live Stock.—Judging of cattle according to breeds, and for beef, milk and draught; feeding and kraaling of live stock; general principles of cattle breeding; management of imported stock; grading up of native or local stock with pure bred bulls.

Dairying.—Home butter-making; building and equipment of a farm dairy; handling and marketing of milk; packing and marketing of butter; construction of cow houses.

Swine Husbandry.—Breeding and feeding of swine; some suggestions for the production of first-class bacon pigs; construction of piggeries at moderate cost.

Chemistry.—The principles of soil fertility; the principles of manuring; the value of lime in agriculture; chemistry of milk and its products (accompanied by demonstrations in milk-testing).

Entomology.—Economic entomology on the farm; the role of insects and their allies in the transmission of disease; scale insects and fruit trees and methods for their control; insect pests and maize; enemies of the potato, insect and fungus; the value and objects of plant import and nursery regulations.

Irrigation.—Methods of applying water to land for irrigation; the measurement of water in connection with irrigation; canal irrigation; storage reservoirs; hints on the selection of sites and on the design of earthen and other dams; irrigation by pumping, with notes on the selection of plants.

Enquiries and invitations should in the first instance be addressed to the Director of Agriculture, Salisbury.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only: —

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultura Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 300. The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E.

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 126. Turkish Tobacco.

No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. Tobacco Culture (Virginia)—Harvesting and Curing.
No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 251. Cultural Notes on Onions, by J. A. T. Walters, B.A.
No. 252. Cultural Notes on Buckwheat, by J. A. T. Walters, B.A.
No. 253. Wheat Production in Southern Rhodesia.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworn, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 226. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.

No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.

No. 53. Animals Diseases Consolidation Ordinance, 1904.

No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.

No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.

No. 95. Oestrus-ovis in Sheep, by Alec King.

No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.

No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.

No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.

No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.

No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.

No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.

No. 223. A Note on Contagious Abortion, by Ll. E. W. Bevan, Government Veterinary Bacteriologist.

LIVE STOCK.

No. 96. Swine Breeds and Breeding of, by Loudon M. Douglas, F.R.S.E.

No. 145. Prospects for Importation of Cattle from Australia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 161. Notes on Cattle Breeding, Part III., by R. C. Simmons.

No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.

No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R. C. Simmons.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.

No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.

No. 242. Construction of Dipping Tanks (Revised).

No. 243. Shedding for Milch Cows, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.

No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.

No. 134. Plans and Specifications for Flue Curing Tobacco Barns.

No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.

No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.

No. 157. Hints on Brickmaking, by G. T. Dyke.

No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.

No. 183. The Rainy Season in Southern Rhodesia, by the Rev. E. Goetz, S.J.

No. 184 Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.

No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.

No. 199. Eucalypts for the Farm, by J. J. Boocock.

No. 205. Home Butter Making, by R. C. Simmons.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 213. Hydraulic Rams, by W. Martin Watt.

No. 217. Windbreaks and Hedges, by F. B. Willoughby.

No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 226. Classification of Clouds.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.

No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.

No. 237. The Analysis of Agricultural Products, Soils, Water, etc.

No. 241. Hints on Cement Concrete, by W. M. Watt.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.

No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist.

No. 254. Hints on Explosives, by W. M. Watt.

No. 255. Pound Fees.

Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.

Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.

Game Law: Summary of.

Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Employment on Farms.

The Department of Agriculture receives numerous enquiries from persons of varied attainments, age and financial position for openings on farms, as managers, assistants and learners, requiring remuneration on corresponding scales, or willing to give services in return for keep.

In order that work may be found for the above and needs of farmers met, applications are invited from both employers and persons seeking employment. Applications are also invited from artisans, such as masons, bricklayers, carpenters, fencers, well sinkers, concrete workers, and the like who may desire work on farms. In cases where employers have obtained the labour they require, or applicants for employment have found work, it is requested that notification be at once sent to the Department of Agriculture, in order that unnecessary correspondence be avoided.

Replies to the following applications should be addressed to the initials of the advertisers, c/o Director of Agriculture, who will forward the letter to the party referred to.

Note.—The following advertisements will not be repeated unless the advertisers inform us they wish them to be continued:—

SITUATIONS VACANT.

E. S.—Farm (Midlands) to lease on three years' agreement; near town and mines; ample water; production to farmer; implements and oxen found; interest in stock. Owner to take small share of produce sold to cover outlay on implements. Applicant must have good credentials and be experienced stockman.

SITUATIONS WANTED.

A. S.—As manager, married man with Colonial and Rhodesian experience of crops and stock, especially dairy work. Salary or salary and shares.

C. T. L.—As manager; experience in all branches of farming in Argentine, Transvaal and Rhodesia. Good references.

A. P.—As manager or assistant, married man; Rhodesian and other experience with crops, dairy and general farming.

R. S. M.—As assistant or on shares. Understands cattle breeding and arable farming. Natal experience. Scotsman, age 23, wounded and invalided.

Government Notices.

No. 21 of 1917.] [19th January, 1917.

REGULATIONS FOR CONTROLLING THE MOVEMENT OF CATTLE.

1. UNDER and by virtue of the powers vested in him by the "Animals Diseases Consolidation Ordinance, 1904," His Honour the Administrator has been pleased to cancel and withdraw Government Notices Nos. 50 and 189 of 1912, 329 and 383 of 1914 and 259 and 320 of 1916, and to make the following provisions in lieu thereof; provided, however, that areas of infection and guard areas fixed under the terms of Government Notice No. 50 of 1912 shall be areas of infection and guard areas for the purposes of these regulations.

2. The various districts of Southern Rhodesia are hereby declared infected for the purposes of section 5 (2) of the aforesaid Ordinance, and, save as hereinafter set out, all movement of cattle within the said districts is prohibited until further notice.

3. The following shall be regarded as places within the boundaries of which the movement of cattle may be allowed without special permission :—

(a) Single farm.

(b) An area occupied by an owner or lessee, under one management, comprising contiguous farms and situated within an area fixed under section 9 hereof. The mere possession by an owner or lessee of grazing rights over a contiguous farm or farms shall not constitute occupation of such farm or farms.

(c) An area the property of one owner.

(d) For grazing purposes, an area within a radius of four miles of native kraals situated on unalienated land or in reserves, save and in so far as such area includes any private land.

The sites of such kraals shall be deemed to be the places where they are situated at the date of promulgation of these regulations.

(e) An area under the management or control of any Municipality, Sanitary Board or Village Management Board.

4. Notwithstanding the provisions of the last preceding section or of section 9 hereof, the Chief Inspector may, on the outbreak of disease or for such other cause as may be deemed expedient, direct the isolation or quarantine of cattle on a limited area of the aforesaid places.

5. The movement of cattle from place to place may be permitted under the special permission, in writing, of the Controller of Stock, the Chief Inspector, Inspector, Sub-Inspector or other officer or person duly authorised by the Administrator to grant such permission.

6. No permission as aforesaid shall permit the movement of cattle—

(a) Without the written consent of the owners, occupiers or managers of occupied land, and, in the case of native reserves, of the Native Commissioner of the district over which land or reserve such cattle will pass, whether along roads or otherwise; provided, however, that refusal to grant such consent shall be in writing, and provided further that if the Controller of Stock or the Chief Inspector shall consider that such consent is withheld without good and sufficient cause he may permit of movement without such consent.

If any such person mentioned above refuse to give consent or to state a reason for refusing to do so, in writing, no valid objection shall be deemed to exist, and movement may be permitted without such written consent.

(b) Through or to an area without the consent of the Cattle Inspector in charge of such area.

7. Cattle moved to any centre for slaughter under the provisions of these or any other regulations shall, on arrival, be immediately taken to such quarantine area (if any) as is provided for the purpose.

8. Cattle admitted to a quarantine area, in terms of the last preceding section, shall be slaughtered within twenty-one days of the date of admission, and shall not be permitted to leave the same except for the purpose of being slaughtered at the appointed abattoir, and if found outside such area, except for the said purpose, may be destroyed on the order of the Controller of Stock or the Chief Inspector; provided, however, that the Chief Inspector may allow the removal of cattle from such area under such conditions as he may prescribe.

9. The movement of cattle in use for draught purposes may be permitted under the provisions of sections 5 and 6 hereof within the boundaries of areas fixed from time to time by the Administrator; provided, however, that permits issued in respect of such movements may authorise the use of such cattle over defined roads for specified periods.

10. All cattle used for draught purposes, except in the areas defined by section 3, sub-sections (a), (b) and (c), shall be clearly and distinctly branded with the registered brand of the owner.

11. All wagons or other vehicles drawn by cattle, in terms of the preceding sections, shall have the owner's name and address legibly and permanently inscribed on the right side thereof.

12. Whenever the owner, occupier or manager of a farm shall adopt means of cleansing cattle running thereon, either by spraying, dipping or by any other method, the Chief Inspector may order any natives or other persons having cattle on the same farm to cleanse such cattle, and the Native Commissioner of the district within which the farm is situated may enter into an arrangement with the native owners of cattle to cleanse such cattle at a charge to be mutually agreed upon between the said owner, occupier or manager and the said native owners.

13. All permits for the removal of cattle issued under the provisions of these regulations shall specify legibly and clearly on the face thereof the place from and to which such cattle may be removed, the route by which they shall travel, the number of such cattle, the time allowed for the journey, and such other particulars and conditions as it may be deemed expedient to provide.

14. No permit issued for the movement of cattle shall be taken to authorise any trespass in connection with such movement.

15. Notwithstanding the provisions of these regulations, it shall not be lawful for any owner of cattle to allow any such cattle to be on any road, public outspan, commonage, or any property other than that of the owner, unless they are free from ticks. Any beast having ten or more ticks on it shall not be considered free from ticks.

16. The following provisions shall apply to areas infected with African Coast Fever.

17. On the outbreak or suspected outbreak of disease the Administrator may declare an area of infection around and embracing the place of outbreak or suspected outbreak, and a further area or areas around such area of infection as a guard area, whereupon all movement of cattle into and from place to place within such area or areas shall be immediately suspended, except as is hereinafter provided.

(1) In areas of infection and guard areas :—

(a) Cattle in transit by rail may be moved through such area.

(b) Cattle from beyond the borders of Southern Rhodesia may be detrained within such area or areas *en route* to destination for the purpose of being fed or watered or transferred to another truck.

(c) The Chief Inspector may, under such safeguards as he deems expedient, allow cattle to be brought into and thereafter leave any such area for a point outside thereof; provided that they are brought in by rail for the purposes of inoculation or *en route* to their destination.

(d) Cattle for *bona fide* farming, dairy and slaughter purposes may be moved into such area or areas by permission of the Chief Inspector and under such conditions as he may impose.

(2) In guard areas only :—

Cattle may be moved into and from place to place within such area under the conditions of section 6 hereof.

18. A permit for a terminal movement of cattle into an infected or guard area, or from one place to another in a guard area, shall authorise the drawing of a wagon or other vehicle by such cattle.

19. The removal of green forage, hay, fodder, bedding, reeds, manure or of such other articles as may reasonably be supposed capable of conveying infection, shall be prohibited from areas of infection, save and except with the special permission of the Administrator.

20. Every person within an area of infection or guard area, or within such further area as may be specified by Government Notice, owning or in charge of cattle, shall, upon the death or slaughter because of disease, suspected disease or accident of any such cattle, immediately report such occurrence through the nearest Cattle Inspector, Native Commissioner or Police Officer to the District Veterinary Surgeon.

21. In areas of infection no cattle shall be destroyed and no *post-mortem* examination shall be held on any cattle without the consent of an Inspector or Sub-Inspector.

22. Notwithstanding the provisions of these regulations, it shall be competent for the Chief Inspector to authorise and direct the movement of cattle—

(1) for the purpose of isolating, dipping, quarantine or any other such objects as may be deemed necessary to prevent or suppress an outbreak of disease;

(2) for the purpose of obtaining food and water;

at his discretion and under such conditions as he may prescribe.

23. Whenever an area shall have been declared an area of infection or guard area, any person who shall by his own act or neglect or that of his herds allow any cattle to stray or be otherwise removed, except as provided for in these regulations, from any one place within such area to another place, or from a place outside of to a place within such area, shall be guilty of an offence against these regulations.

24. In all areas of infection and guard areas, sheep and goats shall be dipped at such periods as may be directed by the Chief Inspector.

25. Any person contravening the provisions of these regulations or the conditions set out in permits issued thereunder, shall, where no higher penalty has been by the said Ordinance or any other law provided, be liable in respect of each offence to a fine not exceeding £20, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

AFRICAN COAST FEVER.

Areas of infection and guard areas declared in terms of Government Notice No. 50 of 1912.

MELSETTER NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Highlands, Rockwood, Joppa, Clearwater, Nooitgedacht, Randfontein, Avontuur, Enhoek, Ravenswood, Roslyn, Woodstock, Landsdown, Heilrand, Kenilworth, Wolvedraai, Houtberg, Springfield, Quagga's Hoek, Rumble Hills, Groenvlei, Cecilton, Grass Flats, Moosgwe, Lombard's Rust, Diepfontein, Wolverhampton, Johannes' Rust, Helvetia, Ostend, Geluk, Morgensen, Jameson and Rocklands.

(b) *Guard Areas.*

That portion of the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri and the Nyanyadzi River.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri and the Nyanyadzi River.

UMTALI NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Penkridge and Thabanchu.

(b) *Guard Area.*

That portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

GWELO NATIVE DISTRICT.

(a) *Areas of Infection.*

The farms Riverbend, Sunbury, Cross Roads, Wegdraai and Reserve.

(b) *Guard Area.*

Bounded by a line drawn from the Gwelo River along the northern boundary of the Main Belt Block to the farm Argyle; thence along the western boundaries of Argyle and Roscobie and from the north-west beacon of the latter in a direct line to the south-west beacon of Summerview; thence along the southern boundaries of Summerview, Hopeton, Leith Hill, Kilkenny, Borisvale and Amiens to the Sebakwe River; thence up the Sebakwe River to the farm Avoca; thence along the western boundary of Avoca, the north-western and south-western boundaries of the Central Estates to the farm Irving; thence along the western boundaries of Irving and Mull to the railway line; thence along the latter to the boundary of the Gwelo Commonage; thence along the easterly and northerly boundaries of the latter to the Gwelo River; thence down this river to the point first named.

SALISBURY AND MAZOE NATIVE DISTRICTS.

(a) *Areas of Infection.*

1. Epworth, Adelaids and Glenwood farms.
2. Sternblick farm.
3. Borrowdale Estate, Helenvale, Glen Lorne, Luna, Carrickcreagh and Greystone farms.
4. An area bounded by and including the following farms: Belford Estate, Belford Estate No. 2, Belford Estate North (excluding that portion

lying east of the railway), vacant land on which the Jumbo Mine is situated (excluding that portion lying north-east of the fence erected between the farm Whitfield and the railway line), Foyle, Welbeck, 100-acre lots and vacant land, Tjibakwe and Belford Estate No. 3.

(b) *Guard Area.*

An area bounded by and including the following farms: Naauwplaats, the southern boundary of Belford Estate, Msasa, Great B, Spelonken, Thetford, Balkiza, Willesden, Welston, Teviotdale, Zizalisari Outspan, Avondale, Salisbury Commonage, Hatfield Estate, the eastern boundaries of Glenwood and Adelaide, Ventersburg, Dispute, Donnybrook, Caledonia, Gardiner, Father Hartmann, Chishawasha, The Crag, The Grove, Halstead, Chindamora Reserve, vacant land west of Poorti River, Glenbervie, Maggiesdale, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal and Mooi Leegte.

MTOKO, MREWA AND MARANDELLAS NATIVE DISTRICTS.

(a) *Area of Infection.*

The Mangwendi and Uzumba reserves, in the native district of Mrewa.

(b) *Guard Areas.*

1. The native district of Mrewa, excluding the Mangwendi and Uzumba native reserves.

2. An area in the native districts of Marandellas and Makoni bounded by and including the farms Train, Hornsey, Isleham, Anwa, Soft, Showers, Gongwe, Tiller, Highlands, Allen, Holton Estate, Reserve, White Gombola, Bonn, Calne, Wilton, The Cave, Mere, Naples, Machiki, Eldorado, Percyvale Estate and Monte Cassino.

3. The native district of Mtoko, excluding the main road between Mtoko and the Makaha valley.

Note.—The above areas were declared under the following Government Notices:—Of 1915, Nos. 247, 283, 394 and 438; of 1916, Nos. 66, 128, 155, 213, 243, 253, 275, 396, and 405; of 1917, No. 12.

No. 214 of 1916.] [9th June, 1916.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—on the farm Riverbend, in the native district of Gwelo, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area comprising the following farms:—Main Belt Block farms east of the Long Valley Spruit, Erin, Doon, Krom River, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathallan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Qua and Bembezaan.

No. 225 of 1916.] [23rd June, 1916.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—at Mrewa's Kraal, in the native district of Mrewa, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

Nos. 381 of 1914 and 200 and 266 of 1916.]

COMPULSORY DIPPING.

UNDER and by virtue of the powers vested in me by section 7 of the "Compulsory Dipping Ordinance, 1914," I hereby declare that the provisions of that Ordinance shall be applied in respect of cattle within the following areas from the date of issue of these Notices, dipping to take place at such intervals as the Chief Veterinary Surgeon shall direct.

The areas under the control of the Municipalities of Salisbury, Bulawayo, Gwelo and Umtali, the Sanitary Boards at Gatooma and Victoria, and the Village Management Boards at Que Que, Melsetter, Penhalonga, Marandellas, Hartley, Enkeldoorn, Avondale, Umvuma, Selukwe, Gwanda, Blinkwater, Plumtree and Rusape.

Further, I do hereby declare that a charge of one penny per head will be made in respect of all cattle dipped at Government dipping tanks, except unweaned calves, for which no charge will be made; and one penny in respect of all horses, mules and donkeys, and ½d. in respect of all sheep.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 7 of the "Animals Diseases Consolidation Ordinance, 1904."

GWELO.

An area comprising the following farms:—Main Belt Block farms east of the Long Valley Spruit, Erin, Doon, Krom River, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathfillan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Que and Bembezaan.

MREWA

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

SOUTH MELSETTER.

All surveyed farms in the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge and Biriwiri, including the Ingorima Reserves and Mafusi Reserve, and excluding the farms Umzelezwe, Nyagadzi, Mhungura, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera.

NORTH MELSETTER AND SOUTH UMTALI.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri, and the Nyanyadzi River; and that portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

SALISBURY AND MAZOE.

An area in the Salisbury and Mazoe native districts bounded by and including the following farms :—Lilfordia, Saffron Waldon, Kilworth, Porta, Reserve, Clement's Plot, Warwickshire, Oatlands, Amalinda, The Rest, Langford, Saturday Retreat, Reserve, Odar, Stoneridge, Longlands, Seki Native Reserve, Dunstan Estate, Banana Grove, Mayfair, Galway Estate, Sebastopol, Gardiner, Gilnockie, Cromlet, Learig, Reserve, Meadows, Mount Shannon, Halstead, western portion of Chindamora Reserve, Pote, Valeria, Spelonken, Arnold's, Smithfield, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal, Mooi Leegte, Reserve, Bitton, Syston, The Lily and Killiemore.

Note.—These areas were declared under the following Government Notices :—Of 1915, Nos. 206, 318 and 355; of 1916, Nos. 215 and 226.

COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 2 of the "Compulsory Dipping Ordinance, 1914."

ENTERPRISE—SALISBURY.

An area bounded by and including the following farms :—Halstead, Mount Shannon, The Meadows, Ivordale, Ivanhoe, Oribi, Colga, Neptune Mashona Kop, Mashona Vlei, Vuta, Chinyika, Lonely Park, Grazeley Guernsey, adjoining vacant ground, Cromlet, Father Hartmann, Chisha washa, Stuhm, The Springs, The Grove and Umritsur.

MELSETTER AND UMTALI.

All surveyed farms and the Ingorima and Mafusi reserves, in the native district of Melsetter, excluding Umzelezwe, Nyagadzi, Mhunguru, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera; and including the following farms in the native district of Umtali : Tom's Hope West, Steynstroom, Thabanchu, Penkridge, Macandrews, Cronley and Lisnacloon.

SALISBURY, MAZOE AND HARTLEY.

An area bounded by and including the following farms :—St. Mary's, Stoneridge, Odar, Reserve, Saturday Retreat, Chizanza, Suum Cuique, Arbroath, Langford, The Rest, Amalinda, Oatlands, Warwickshire, Clement's Plot, Reserve, Porta, Lyndhurst, Riverside, Herren Hausen, Lilfordia, Killiemore, The Lily, Ballineety, Fairview, Spa, Passaford, Springvale, Mbebi, Umsasa, Great B, Christon Bank, St. Gerera, Willesden Farm, Borrowdale Estate, Luna, Glen Lorne, Gletwyn, Sternblick, Manresa, Caledonia, Sebastopol, Galway Estate, Mayfair, Nalire Reserve, Buena Vista and Seki Reserve.

MAKWIRO—HARTLEY.

An area bounded by and including the following farms :—Umfulia, Dorothy Hill, vacant land, Seigneury Reserve, Zimbo Junction, Serui Drift, Strathmore, Scotsdale, Cape Boys' Reserve, Railway Farm No. 22, vacant land between Railway Farm No. 21 and Spencer, Spencer, Railway Farm No. 23, Woodsgift, Railway Farm No. 25, Southwood, Northwood, Niklot, Roth-

well Extension, Hunyani Estate, Hunyani Estate No. 2, Stanhope, Cromdale, Garthnor, Serui, Curlewood, Cotswold and vacant land and farms lying within a line from the most easterly beacon of Cotswold to the north-east beacon of Fort Martin, thence to the south-east beacon of Fort Martin and from there due south to the Umfuli River and down that river to the farm Umfulia.

MARANDELLAS AND SALISBURY.

An area bounded by and including the following farms :—Rakodsi, Longlands, Shepparton (portion of Lendy Estate), Progress, Rockery, Shortlands, Rastenburg, Loquat Grove, Cornwall, Norfolk, Middlesex, Kent, Suffolk, Sussex, Rupture, Argosy, Weir, Inandu, Seaton, Rapture, Sunny Fountains, Mangwendi Mission, Retreat and Springvale.

SHAMVA—MAZOE.

An area bounded by and including the following farms :—The Carse, Burnleigh, Woodlands, Ceres, Murgwi, Zombi, Chewarika, Maienzi, Maxton, Lone Star Reserve No. 2, Richlands, M. E. D. Reserve, New Brixton, Dillon, Mullingar, Mumwi, Chipoli, Ellerslie, Wolley, Wapley, Lion's Den, and thence from the south-eastern beacon of Lion's Den up the Poorti River to the north-western beacon of The Carse.

RUSAPE—MAKONI.

An area bounded by and including the following farms :—The Willows, The Springs, Howick, Leeuw Poort, Highfield, Emerald, Kirkly Vale, Lawrencedale Estate, Chimbi, Notgotimyet, Diana, Inyagura, Cheira, Cheira Source, Invercargill, Wick, Makoni Reserve, Mount Zonga, Reserve, Inyamasanga, Windsorton, Manda, Zimati, Mount Tikwiri, Rocking Stone, Lesapi Falls, Recondite, Cheronga and Lesbury.

BINDURA—MAZOE.

An area bounded by and including the following farms :—Wiseacre, Erin, Pimento Park, Duiker Flat, Jesmond Deane, The Ridge, Malvern, Selwood, Marston, Nan Terra, Retreat, Nomansland, Vergenoeg, Caledon, Chiwaridza Reserve, Dengeni, Vredehoek, Arcadia, Hereford, The Vale, Bonny, Wild Dog Valley, Atherstone, Kingston, Hildadale, Cardiff and Poorti Outspan.

HEADLANDS AREA, MAKONI.

An area bounded by the Nyagadzi River from where it intersects the northern boundary of Fairfield Estate, down this river to the Chikore Reserve and along the south-west boundary of this reserve to the Mwaruzi River, and down this river to the Inyongombi River; thence in a southerly direction up this river to the north-east beacon of Rathcline; thence along the northern and western boundaries of Rathcline and western boundary of Bannockburn North, the southern boundaries of Inyati Block and Yorkshire Estate to a point directly opposite to the most northerly beacon of De Vos; thence by and including the farms De Vos, Lone Kop, Moodiesville, Reserve, Netzewa, Fischerville, Wakefield, Urmston; thence up the Macheke River to the southern beacon of Monte Cassino; thence along the southern and eastern boundaries of that farm and from its most northern beacon in a direct line to the south-western beacon of Changwe Ranche No. 1; thence along the northern boundary of Fairfield Estate to the first-named point.

UMVUMA AREA, CHILIMANZI AND CHARTER.

An area bounded by and including the following farms :—Pela, Pansi, Ensimoen, Richmond, Vosges, Kombisa, Kanya, Blackwood, Tshamamvura, Smithvale, Grootfontein, Mtao, Aldebey, Welstead, Lovedale, Central Estates, Sebakwe, Xmas and Bushy Park.

MATABELELAND.

That portion of Matabeleland lying west of a line drawn from a point where the Gwaai River enters the Zambesi River; thence up the former

and the Shangani River to the northern boundary of the Karna Block; thence following the northern and eastern boundaries of this block to the Karna River; thence up this river and the northern and eastern boundaries of the Shangani Native Reserve to the Shangani River; thence up this river to the northern boundary of Kenilworth Block; thence by and including Kenilworth Block, North Shangani Farm, Baltimore, Lynes Farm, Joseph Block, Bulawayo Syndicate Block, Mbati Tiabetsi Block, Shangani Reserve and Reserve, Battle Farm, Leechdale, Thornville, Dandasi, Ripley, Bon Accord, Liscard, Belmont, Forfar, De Beers Block and Torwood Lee; thence in a northerly direction along the northern boundary of Belingwe Reserve No. 1 to the Lundi River; thence down this river to a point where the old pioneer road crosses it; thence down this road to the Nuanetsi River, and down this river to the northern boundary of Wanezi Block; thence along the eastern and southern boundaries of this block and Jopempi Block to a point where it is crossed by the road from Mazunga to Messina; thence along the eastern boundary of this road to the Limpopo River.

HARTLEY—GATOOMA—BATTLEFIELDS.

An area bounded on the north by the Umfuli River from its junction with the Umniati River to its junction with the Doronanga River; on the east by and including the Mondoro Native Reserve and the British South Africa Company's Rhodesdale Ranche; on the south by and including the Rhodesdale Ranche; on the west by and including the Rhodesdale Ranche to the Sebakwe River; thence down that river to its junction with the Umniati River, and down that river to its junction with the Umfuli River.

VICTORIA.

From the junction of the Ngesi and Shasha Rivers up the latter river to the southern boundary of the Gurajena Native Reserve; thence along the southern boundaries of this reserve and the farms Drewton and Clarkdell to the Makoholi River; thence down this river to the south-west corner of the Nyamarundu Native Reserve, and along the southern boundaries of this reserve and the Zimutu Reserve to the Umyambi River, and down this river to the Popotekwe River; thence eastwards along the boundaries of the Victoria and Ndanga native districts to the Chishire River and up this river to its headwaters; thence in a straight line to Mount Bungu; thence along the north-western and western boundaries of the Makouri Native Reserve to the farm Allendale; thence by and including the farms Allendale, Cardigan, Glendhu, Iram, Vlakfontein, Niekerk's Rust, Iwade, Histonhurst, Arawe, Cheveden, Inyoni, Kelvingrove, Erichsthal, Oatlands, The Retreat, Morgenster, Mzero and Tentergate to the south-western beacon of the latter farm; thence in a north-westerly direction to a point on the Pioneer Column Road and southwards along this road to the Tokwe River; thence up this river and the Shasha River to the starting point.

Note.—These areas were declared under the following Government Notices:—Of 1915, Nos. 402 and 423; of 1916, Nos. 21, 22, 98, 126, 159, 208, 370, 373 and 460; of 1917, Nos. 42, 45, 65 and 108.

No. 79 of 1917.] [2nd March, 1917.

COMPULSORY DIPPING OF CATTLE: UMTALI AREA.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of the "Compulsory Dipping Ordinance, 1914," as aforesaid, should do so on or before the 3rd May, 1917.

Description of Area.

The native district of Umtali, excluding that portion lying west of the Odzi River, and also excluding the farms Tom's Hope West, Steynstroom, Thabanchu, Penkridge, MacAndrews, Lisnacloon and Cronley.

No. 84 of 1917.] [2nd March, 1917.

COMPULSORY DIPPING OF CATTLE: NORTON AREA, HARTLEY AND SALISBURY DISTRICT.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 4th May, 1917.

Description of Area.

Starting from the north-western beacon of the Gwebi Native Reserve; thence following the northern and eastern boundaries of this reserve, the northern and western boundaries of Herrenhausen and the western boundary of Riverside to the Hunyani River, up this river to the north-eastern beacon of Elladale; thence to the south-eastern beacon of this farm; thence along the northern and western boundaries of Suum Cuique to the north-eastern beacon of Arbroath; thence following the northern, western and southern boundaries of this farm, the southern boundary of Suum Cuique and the eastern boundary of Chisandtsa till the Hunyani River is again reached, and up this river to the north-eastern beacon of Tivoli Reserve, and along the eastern boundary of that reserve, the eastern and southern boundaries of Gilston and the southern boundaries of Carnock and Ardno to the Ganga Native Reserve; thence south-westwards along the boundary of this reserve to the Umfuli River, and down this river to a point opposite to the south-eastern beacon of Fort Martin; thence to that beacon and along the eastern boundary of this farm to its most northern beacon; thence direct to the south-west beacon of Marsden; thence following the boundaries of the following farms, which will include them: Marsden, Braeside, Jenkinstown, Ardmore, Makwiro Source, Pulham, Philiphaugh, Railway Farm No. 29, Cressydale, Gwebi Junction and Eclipse Block to the first-named point.

No. 85 of 1917.] [2nd March, 1917.

COMPULSORY DIPPING OF CATTLE: CENTRAL MAZOE AREA.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 4th May, 1917.

Description of Area.

Starting from the south-west beacon of the Chiweshe and Negomo Reserve on Mount Ndiri; thence following the eastern and northern boundaries of this reserve to the south-west beacon of Lawley's Concession; thence eastward and southward along the Mazoe native district boundary to the south-east beacon of Batcombe; thence direct to the most northerly beacon of Ledbury; thence by and including the following properties: Ledbury, vacant land, Benwell, Glen Douglas, Simoona Reserve, Geluk,

Avonduur, Gosforth, Jeta Reserve, Msana Reserve, Chikwakwa Reserve, Strathlorne, Saratoga, Bally Vaughan, Chindamora Reserve, Thelksinoi, Elpidha, Balkiza, Thetford, Spelonken, Arnold's, Smithfield, Tatagura Plot, Yarrowdale, Normandale, Summerdale and Moore's Concession to the first named point.

No. 22 of 1917.] [19th January, 1917.

IMPORTATION OF CATTLE.

HIS Honour the Administrator has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notices Nos. 186 of 1914, 169 and 342 of 1916, and, notwithstanding any general restrictions on the importation of cattle, to make the following provision for the introduction of certain classes of cattle from the Cape Province, the Orange Free State and the Transvaal.

1. The following classes of cattle may be imported direct from farms or stock sales approved of by the Chief Inspector in the Cape Province, the Orange Free State or the Transvaal :—

(1) cattle with not more than two permanent central incisor teeth;

(2) cattle, irrespective of age, if entered in a South African Stud Book or appendix thereto, or cattle entered in a Stud Book which were originally imported from Great Britain or Ireland, the United States of America or the Kingdom of the Netherlands.

2. No importation as aforesaid shall be permitted until application for permission to import shall have been made, accompanied by a certificate in the form of the Annexure "A" or "B" as the case may be, and until a permit to import shall have been issued by the Chief Inspector, which may contain such conditions as shall from time to time appear expedient.

3. The importation of cattle from Great Britain and Ireland, the United States of America and the Kingdom of the Netherlands may be permitted under the following terms and conditions :—

(1) a permit shall be required from the Chief Inspector, which may contain such conditions as shall from time to time appear expedient;

(2) importations shall be through and direct from the ports of Cape town or Port Elizabeth.

4. All importations shall be by rail, and for the purposes of importation Bulawayo shall be the port of entry.

5. All cattle imported in terms of these regulations shall, on arrival at Bulawayo, Salisbury or Umtali, be submitted to such examination or tests as the Chief Inspector may direct. If such examination or tests disclose the existence of any destructive disease, the cattle shall be immediately destroyed and the carcases thereof disposed of in such a manner as a Government Veterinary Surgeon may authorise or require. The Chief Inspector may permit of the age restriction and the tests aforesaid being dispensed with in the case of cattle in transit by rail to any place beyond the borders of Southern Rhodesia.

6. All expenses or losses incident to quarantine, examination, testing or destruction as aforesaid shall be borne by the owner of the cattle.

7. Any person introducing cattle in contravention of these regulations or failing to comply with any of the conditions attached to permits to import, or furnishing applications, declarations or other necessary documents known to be false in any material particular, or failing to comply with all lawful directions as to quarantine, examination, testing, destruction or disposal of carcases, shall be liable to a fine not exceeding £20 for each animal in respect of which such offence shall have been committed, and in default of payment to imprisonment with or without hard labour for any period not exceeding six months, unless higher or greater penalties shall have been provided for such offences by the "Animals Diseases Consolidation Ordin-

ance, 1904"; provided, however, that the penalties imposed by these regulations shall not exempt any cattle from destruction in terms of the aforesaid Ordinance.

Southern Rhodesia.

ANNEXURE "A."

IMPORTATION OF CATTLE

entered in a South African Stud Book or appendix thereto, or imported originally from Great Britain and Ireland, the United States of America and the Netherlands.

I.....residing on the farm.....
in the district of.....in the Union of South Africa, do solemnly and sincerely declare that the.....(number in writing) animals enumerated below have been in my possession from.....(date), and that lung-sickness has not existed amongst any of my cattle since that date, and that none of such animals is prevented by any regulations or agreement in respect of freight from being exported from the Union of South Africa.

Description of Animals.

Breed.	Sex, name and number in Stud Book.	Country of origin.
.....		
.....		
.....		
.....		
.....		

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of.....
19.....before me,

.....
Resident Magistrate for the district of
.....

Names of former owners.....
.....
.....

Purchaser's name
Place in Southern Rhodesia to which animals are being sent.....

Southern Rhodesia.

ANNEXURE "B."

IMPORTATION OF CATTLE

other than cattle originally imported from overseas and cattle entered in a South African Stud Book.

I,.....residing on the farm.....
in the district of.....do solemnly and sincerely declare that the.....(number in writing) animals also enumerated below have been in my possession since birth, and that lung-sickness (contagious pleuro-pneumonia) has not existed amongst any of my cattle nor on my farm during the last four years, and that these animals have never been previously exposed for sale in any public market or stock fair.

Number of animals..... Bulls..... Heifers.....
Breed.....
Seller's name and address.....
.....
Purchaser's name.....
Place in Southern Rhodesia to which animals are being sent.....

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of..... 19.....before me.

.....

Resident Magistrate for the district of

.....

IMPORTATION OF STOCK FROM THE PROVINCE OF THE CAPE OF GOOD HOPE.

WITH reference to Departmental Notice of 12th July, 1913, it is hereby notified that the said Notice is cancelled, and that from date hereof permits may be issued for the importation of cattle into Southern Rhodesia from all parts of the Province of the Cape of Good Hope with the exception of the following districts :—

Komgha, Stutterheim, Cathcart, Maclear, Indwe sub-division of Wodehouse, Queenstown (Gwatyu Ward only), Glen Grey, Elliot Slang River.

30th March, 1917.

No. 364 of 1914.] [27th August, 1914.

REGULATIONS GOVERNING IMPORTATION OF LIVE STOCK, ETC.

UNDER and by virtue of the powers vested in me by the "Animals Diseases Consolidation Ordinance, 1904," as amended from time to time, I do hereby cancel the regulations published under Government Notices Nos. 295 and 394 of 1908; 38, 61 and 263 of 1909; and 60 of 1911 and 188 of 1912, 47 of 1913, and so much of any other regulations as may be repugnant to or inconsistent with the subjoined regulations, which are hereby declared to be of full force and effect.

1. The importation of the following animals from the respective countries or districts enumerated is prohibited, owing to the existence or supposed existence of destructive diseases affecting the said animals in the said countries :—

(1) All animals and dogs as defined by the aforesaid Ordinance from—

India,
Mauritius,
Persia,
British Burmah,
Assam,
China and bordering countries, including Korea,
French Indo-China,
Dutch East Indies,
Hong-Kong,
Federal Malay States,
The Philippines,
Zanzibar,

and all other countries where surra is known or suspected to exist.

(2) Pigs from the Union of South Africa, the Bechuanaland Protectorate, the Tati Concession, and other countries in which swine fever exists or is suspected to exist, subject, however, to the exceptions contained in the proviso to this section.

(3) Dogs from the territories of Northern Rhodesia and Portuguese East Africa, subject, however, to the exceptions in the proviso of this section.

(4) Sheep and goats from the districts of Albany, Alexandria, Bathurst, Bedford, East London, Fort Beaufort, Humansdorp, Jansenville, Kingwilliamstown, Komgha, Peddie, Somerset East, Stockenstroom, Uitenhage and Victoria East, in the Cape Province; the districts of Barberton, Lydenburg, Marico, Pretoria, Rustenburg, Waterberg and Zoutpansberg, in the Transvaal; Swaziland, Portuguese East Africa, Northern Rhodesia.

Provided, however—

(a) that the Chief Inspector may at his discretion permit the importation of pigs, sheep and goats from the above-mentioned places on production of a certificate signed by a duly authorised Government Veterinary Officer in the form of Schedule "A" attached hereto;

(b) that the importation of dogs required for scientific purposes only may be permitted from the places mentioned in sub-section (3) hereof, by the Chief Inspector, in writing, subject to such conditions as may be imposed by him;

(c) that dogs, sheep, goats and pigs from countries from which importation is permitted may be introduced *via* the port of Beira, provided that all such animals shall be transferred directly after disembarkation to the railway trucks at Beira, and conveyed thence to Umtali without leaving the said trucks.

2. The areas set out in Schedule "B" hereto are hereby appointed for the depasturing and quarantining of animals for slaughter in connection with the places therein mentioned.

3. The several districts of Southern Rhodesia are hereby declared to be an area infected with scab amongst sheep and goats, and the movement of all sheep and goats from any farm to beyond the limits thereof, or from their usual grazing ground within the limits of any town lands or native reserves to any other place, is prohibited, except under the written permit of an Inspector or Sub-Inspector. Such permit shall set forth the number and description of animals to be moved, the route they shall travel, and the period for which the permit shall be in force. In cases where it may be necessary or desirable, the person to whom such permit is issued may be required to cause the animals referred to therein to be dipped before being moved.

4. The introduction of sheep and goats is prohibited except—

(a) as specially provided for by section 1 hereof;

(b) from places not mentioned in section 1, if accompanied by a certificate in the form set out in Schedule "C" hereof.

5. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by rail shall immediately report such arrival to the Veterinary Office at Salisbury, Bulawayo and Umtali respectively, and no such animal shall be detrained at any intermediate station without the written authority of a Government Veterinary Surgeon.

6. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by road shall immediately report such arrival at the Police Camp nearest to the place where such entry is made, and the officer in charge of such Police Camp shall immediately report to the Veterinary Department, which shall direct what steps are to be taken to test such animals with mallein, as in the following clause provided.

7. All horses, mules and donkeys, upon entering Southern Rhodesia, shall be tested with mallein, and the owner or person in charge of such animals shall in all respects carry out the lawful directions of the Inspector while such animals are being tested; provided that this regulation shall not apply to animals in transit through Southern Rhodesia which are not detrained *en route*.

8. Horses, mules and donkeys lawfully in this Territory, and required for purposes necessitating frequent crossing of the border, may be allowed

to so cross on such terms as to registration, branding, testing and conditions as the Chief Veterinary Surgeon may from time to time deem expedient to prescribe.

9. An Inspector may direct the thorough cleansing and disinfecting of trucks which may be reasonably suspected of being sources of infection of any destructive disease, and may direct the destruction of truck fittings, fodder, excreta, or other matter or thing which may be reasonably calculated to convey such infection.

10. Any persons contravening the provisions of these regulations, or the instructions or directions given in terms of these regulations, shall be liable in respect of each offence to a penalty not exceeding twenty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months, unless where more or heavier penalties have by the aforesaid Ordinance, or by other regulations framed thereunder, been expressly provided.

SCHEDULE "A."

Certificate.

Issued under provisions of section 1, Government Notice No. 364 of 1914.

This is to certify that the animals enumerated below are, in my opinion, free from any destructive disease, including heartwater; and, to the best of my knowledge and belief, have not been in contact with any infected animals, nor come from, or through, a locality where any such disease is known to exist or has existed for twelve months from date hereof.

Date....., 19...

Place

.....

Signature of
Government Veterinary Surgeon.

Number and general description of animals :

.....Pigs, ...Sheep, ...Goats.

Place from which animals are to be sent :

.....

Owner's name and address :

.....

.....

Place in Southern Rhodesia to which it is desired to send the animals

SCHEDULE "B."

Description of areas set apart for depasturing and quarantining of animals for slaughter.

Salisbury.—A fenced piece of land, 400 acres in extent, situated on the Makabusi River below Maggio's plot, within the Salisbury commonage and towards the southern boundary thereof.

Bulawayo.—That piece of fenced land situated on the Bulawayo commonage between the railway line, to the south, and the Solusi road, adjoining and to the south-west of the Government dipping tank, in extent 1,000 acres more or less.

Gwelo.—Starting from a point where the Ingwania road crosses the railway, along this road past the sanitary stables to a point a quarter of a mile west, thence in a line parallel with the railway to the Gwelo River, thence along the river to the commonage beacon No. 11, thence in a straight line to the Shamrock road where it is intersected by the Scout's Spruit, thence along the Shamrock road to where it joins the Main Street extension, thence along this to the railway line, and down this to the starting point.

Umtali.—A piece of fenced land situated on the old Darlington Farm section of the Umtali commonage.

Penhalonga.—A piece of fenced land situated on plot No. 2, Imbeza plots.

Selukwe.—A piece of fenced land, in extent about 300 acres, situated on the farm Sebanga and adjacent to the township of Selukwe.

SCHEDULE "C."

I, ... residing at
in the district of... in the.....
Colony, do solemnly and sincerely declare that the animals enumerated below are free from any contagious disease, including scab, and have not been in contact with any infected animals within six months from date hereof, and that, to the best of my knowledge and belief, such animals, in travelling to.....† station, will not come in contact with any animals amongst which scab or any other contagious disease exists.

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....
day of.....before me.

.....

Magistrate, Government Veterinary Surgeon, Scab Inspector, or Police Officer of district from which animals are being sent.

Number and general description of animals being sent.....
Owner's name and address.....
.....
Place in Southern Rhodesia to which animals are being sent.....

† Station within Colony of origin.

ISSUE OF PERMITS FOR THE REMOVAL OF STOCK.

IT is hereby notified for public information that His Honour the Administrator has approved of members of the British South Africa Police issuing permits for the removal of cattle, sheep and goats at the undermentioned stations when no Inspector or Sub-Inspector of Cattle is available :—

Nyamandhlovu.	Mphoeng's.
Gwanda.	Holi.
Plumtree.	Filabusi.
Fort Rixon.	Gwaai.
Belingwe.	Figtree.
Inyati.	Umvuma.
Fort Usher.	Que Que.
Mazunga.	Tuli.
Makwiro.	Sinoia.
Banket Junction.	Buhera.
Makaha.	Beatrice Mine.
Sipolilo.	Wedza.

No. 23 of 1917.] [19th January, 1917.

HIS Honour the Administrator has been pleased, under the provisions of section 5, sub-section (1) of the "Animals Diseases Consolidation Ordinance, 1904," to approve of the appointment of the persons named in the subjoined list as Cattle Rangers for the district of Hartley for the purposes of examining cattle permits, detaining cattle being irregularly moved, detaining cattle infested with ticks and supervising the dipping of cattle in areas under the provisions of the "Compulsory Dipping Ordinance, 1914."

District.	Nominee.
Umsweswe	John William Banner, Umsweswe.
Eiffel Flats	Geoffrey Cotton Woodforde, Eiffel Flats.
Lydia	Reginald Heber Ullyett, Acorn Mine, Gatooma.
Golden Valley	John Mack, Golden Valley.
Shagari	Henry Fenwick Thompson, Shagari.
Umniati	Fred Morgan Linscott, Golden Valley.
Hartley Township	Dennis Handrick, Hartley.
Duchess Hill	Charles Edward Simpson, Concession Hill.
Gatooma—Hartley Road	Robert Appleton Sworder, Hartley.
South of Duchess Hill	William Muter Leggate, Hartley.
Old Hartley—Hartley Road	Frederick Percy Quinton, Hartley.

SUMMARY OF THE GAME LAWS.

Game is divided into three distinct classes, described as follows :—

(a) Birds and Small Buck.

(b) Bushbuck, Hartebeest, Impala, Lechwe, Pookoo, Roan and Sable Antelope, Sitatunga, Tsessebe, Waterbuck, and Wildebeest.

(c) Royal Game, which includes Eland, Elephant, Giraffe, Gemsbok, Hippopotamus, Inyala, Koodoo, Ostrich, Rhinoceros, Springbuck and Zebra.

The shooting season for Class "A" is as follows :—

In Mashonaland :

Birds from 1st May to 30th September.

Small Buck from 1st May to 31st October.

In Matabeleland :

Birds and Small Buck from 1st May to 31st October.

To shoot in Class "A" a licence costing £1 per annum is required. This entitles holders to hunt in both Provinces during the open season.

Class "B."—The season opens on 1st July and closes on 30th November in both Provinces. The licence fee is £25 for non-residents and £5 for persons having their domicile in Southern Rhodesia. This licence entitles the holder to shoot up to 15 head, which number may be increased to a total of 25 upon payment of a further sum of £15 in the one case and £5 in the other.

Class "C."—The Administrator may, if he is satisfied that the animals are actually required for scientific purposes, grant to the holder of a game licence permission to shoot or capture any of the species included in this Class. Such permit requires a £5 stamp. Applications in writing, together with proof of *bona-fides*, should be addressed to the Director of Agriculture.

Game for Farming Purposes.—Permits may be granted for the capture of Eland, Ostrich, Zebra or other animals for the purposes of breeding or farming. Such permits require a stamp of the value of £1 and remain in force for six months. Application, accompanied by a sworn declaration, should be made through the Director of Agriculture or the Civil Commissioner of the district.

Game Injuring Crops.—The occupier of any cultivated land or any person acting under the authority of such occupier, may at any time destroy game actually doing damage on such land.

Export of Game.—No living Game or the Eggs of any Game Birds may be exported beyond the limits of Southern Rhodesia without a written permit.

Shooting on Private Land.—A licence does not entitle the holder thereof to shoot on private land without the permission of the land-owner.

Farmers Shooting Game on their Farms.—By taking out a special £1 licence, farmers may at any time shoot any game on their land. "Game" does not include any birds, except ostriches.

Open Area.—The shooting or capturing of all classes of game with the exception of ostriches and other birds classified as game is permitted within the following area in the Hartley district until further notice :—

Hartley District.—From the railway bridge on the Umfuli River, thence north-westwards along the Umfuli River to where it joins the Umniati River, thence southwards along the Umniati River to where it joins the Umsweswe River, thence eastwards along the Umsweswe River up to the drift at the Lydia Mine, thence along the old road from Lydia Mine to Etna Mine and to Inez Mine, thence northwards along the road from Inez Mine to Hartley, thence in the direction of the railway bridge to the starting point on the Umfuli River.

The game specified may be shot in this area without a licence.

Protected Area.—All game is strictly preserved in the Urungwe Game Sanctuary as defined below :—

An area in the Lomagundi district, bounded as follows : On the north and west by the River Zambesi, starting at the point where the Lozenzi River joins the Zambesi, and following the course of the latter river to its junction with the Sanyati River; on the east by an imaginary line drawn from the junction of the Indurune and the Nyaodsa Rivers to the head-waters of the Lozenzi River, and thence along the course of the Lozenzi River to its junction with the Zambesi River; on the south by an imaginary line drawn due west from the point of junction of the Indurune and Nyaodsa to the Sanyati River, thence along the course of this river to where it enters the Zambesi.

Game in Class "A" may be hunted in the close season until further notice on private land in the Melsetter district by holders of a licence.

"Locust Birds" are strictly protected, *vide* Government Notice No. 390 of 1912.

Elephants on Occupied Farms, Melsetter.—The destruction of Elephants when found on occupied farms on the High Veld in Melsetter District is authorised (*vide* Government Notice No. 284 of 1908).

Trespassing on native reserves, in pursuit of game or otherwise, is prohibited, except with the written permission of the Chief Native Commissioner.

Trypanosomiasis.—Persons in search of game in the southern part of the Sebungwe district are warned of the danger of hunting anywhere west of the Sengwe and Lutope Rivers within the fly area, and especially of proceeding anywhere within the valley of the Busi River.

No. 249 of 1908.] [27th August, 1908.

PROTECTION OF TREES.

IT is hereby notified for public information that any person who shall cut down for use as fuel, or for any other purposes than *bona-fide* farming, mining or manufacturing purposes, or cause to be so cut down the "Wild Westeria" (native name M'Pakwa or M'poea) tree, will be liable to prosecution for contravention of the provisions of the Forest and Herbage Preservation Act, 1859, and upon conviction to a fine not exceeding £100, or to imprisonment with or without hard labour for a term not exceeding six months, or to such fine and imprisonment, or to such imprisonment without a fine.

No. 163 of 1909.] [29th July, 1909.

ANY person who shall cut down or destroy, or cause to be cut down or destroyed, the "Shuma" or "Mashuma" tree, except under written authority from the Estates Office of the British South Africa Company, and subject to such conditions as may be imposed therein, will be liable to prosecution for contravention of the "Forest and Herbage Act, 1859," and, upon conviction, to a fine not exceeding £100, or to imprisonment, with or without hard labour, for a term not exceeding six months, or to such fine or imprisonment, or to such imprisonment without fine.

No. 41 and No. 67 of 1917.] [9th February and 23rd February, 1917.

APPLICATIONS FOR USE OF WATER

in terms of Chapter I. of the "Water Ordinance, 1913."

IT is hereby notified that the following applications have been made, in terms of the "Water Ordinance, 1913," for authority to use water :—

Name of applicant.	From what river.	Native district of	For the purpose of irrigating a certain portion or portions of the
G. P. Bothma	Unnamed	Inyanga	Farm Cheshire
Meikle Bros.	Mrodzi	Mazoe	,, Protea
R. W. Cockerell	Umtali	Umtali	,, Matika's Kloof
P. Reimer	Ruwiza (Umturi)	Salisbury	,, Stuhm
Rhodesia Lands, Ltd.	Garana-pudzi	Mazoe	,, Howick Estate
J. R. Gates (Methodist Episcopal Church)	Umtali	Umtali	Farms Ngambi, Old Town and Woodlands
Mrs. A. J. Weitsz	Unnamed	Inyanga	Farm Doornhoek
H. H. Marriott	Garana-pudzi	Mazoe	,, Umvurradonna
E. Scott	Wengi	,,	,, Nyachura
E. Scott	Garana-pudzi	,,	Farms Thorncreek and Wormwood
British South Africa Company	Mazoe	,,	Farms Valeria, Arnold's, Smithfield, Brundret, Maggiesdale, Glenbervie and Tatagura Reserve.

Any person or persons whose rights may be affected thereby are hereby called upon, in terms of the regulations published under Government Notice No. 439 of 1915, to lodge, within three months from the date hereof, at the office of the Water Registrar, Salisbury, from whom further particulars are obtainable, their objections (if any) to the granting of these applications, together with a full statement of the grounds for such objections.

Department of Posts and Telegraphs,

Southern Rhodesia.

Postal Notice No. 12 of 1913.

AGRICULTURAL PARCELS POST.

IT is hereby notified for public information that, on and after the 1st August, 1909, any article produced, and, if manufactured, produced and manufactured within Southern Rhodesia may be transmitted by Agricultural Parcels Post at the reduced rate of threepence per lb. or fraction thereof, up to a limit of eleven lbs. in weight.

The Agricultural Parcels Post is designed to bring the producer into direct communication with the consumer, and is available for the transmission of :—

Biscuits	Dried Meats	Plants
Bread	Eggs	Poultry
Butter	Flour	Seeds
Confectionery	Flowers	Sugar
Cigarettes	Honey	Tobacco
Dried & Bottled Fruits	Jam	Wool Samples

and other articles produced within Southern Rhodesia. It does not extend beyond the borders of Southern Rhodesia.

The senders of articles at the reduced tariff applicable to the Agricultural Parcels Post will be required to sign a declaration that the contents are the *bona fide* produce of Southern Rhodesia.

The limits of size and weight, and the general regulations, are those applicable to the Inland Parcels Post.

G. H. EYRE,
Postmaster General.

General Post Office, Salisbury,
31st March, 1913.

RHODESIA

Agricultural Journal.

ISSUED BY

The Department of Agriculture,

SALISBURY, RHODESIA.

ADVERTISEMENTS.

The Journal is issued every alternate month.

Application for advertising space should be addressed to the Editor. The rates are as follows, *per issue*:—

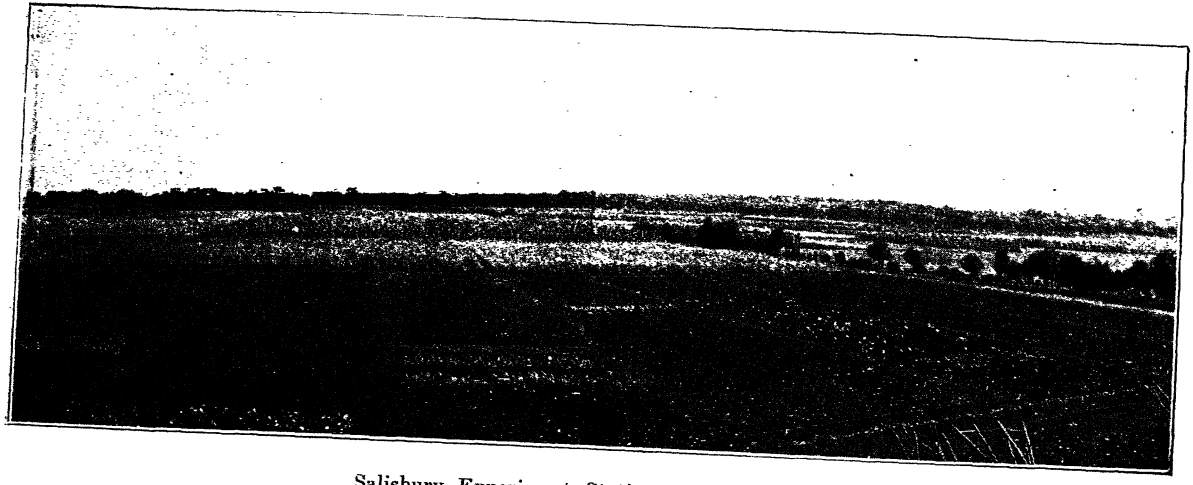
Position.	Whole page. £ s. d.	Half page. £ s. d.	Quarter page. £ s. d.
Inner pages - -	**2 0 0**	**1 5 0**	**0 15 0**
Outer cover (back) -	**4 0 0**	—	—
Inner covers (back and front) and page facing Contents	**3 0 0**	**1 15 0**	**1 0 0**

A discount of 10 per cent. will be allowed for standing or consecutive advertisements running through six issues. Remittances, and electros where desired, should accompany orders. The right is reserved to discontinue the insertion of standing or consecutive advertisements should payment beyond the second issue be delayed.

The right of approval of all advertisements by the Director of Agriculture is reserved, and his decision as to the acceptance or rejection is final.

An additional charge may be made for advertisements printed in special type, equal to any additional charges made by the printers for setting up same.

Advertisements will be accepted from *bona fide* farmers wishing to effect sale, purchase or exchange of produce, live stock or farm implements, at a minimum charge of 2/6 per insertion of 20 words. Extra words will be charged for at the rate of 1/- for every 10 words.



Salisbury Experiment Station. April, 1917.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—NO. 3.] JUNE, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

GOVERNMENT EXPERIMENT FARM, GWEBI.—During the month of March a visit was paid by the Lomagundi Farmers' Association to the experiment farm at Gwebi. A day and a half was spent on the farm, and the party inspected the various plots, which were fully explained to them. They also inspected the stud herd of Friesland cattle and the flock of Merino sheep, and were addressed by members of the Department of Agriculture on different phases of the investigations in progress. The party manifested deep interest in everything

that was shewn to them, and were very appreciative of everything that was going on, and took note alike of the successes and failures and of points to be followed or to be avoided. The excursion was completely successful, and it is to be hoped that it will be repeated another year, not only by the Lomagundi farmers, but by associations from other quarters as well.

Potatoes.—The possibility of exporting potatoes from Rhodesia to England, where they are so much wanted, has of late received consideration, with the result that it does not seem practicable to carry the idea into effect. The possibility, however, exists of disposing of our potatoes in the Union, and thereby releasing corresponding quantities for despatch over-sea out of crops grown nearer to the seaboard. In this connection we would remind readers of the special rates offered some time ago by the railways, but of which advantage does not appear then to have been taken, and which under the altered conditions might now be attractive. The rate offered to Johannesburg is £2 per ton in ten ton lots from any station Umtali to Gwelo, including Mazoe and Lomagundi branches. This rate is equivalent to 3s. per bag of 150 lbs., which should enable Rhodesian growers to effect considerable sales.

Encouragement of Poultry Farming.—The annual show of the Salisbury and District Poultry Club will be held as usual in conjunction with the Salisbury Agricultural Show, and the club have been fortunate in securing the services this year of Mr. P. J. Truter, of Bloemfontein, a well-known judge and authority, not only for the purpose of adjudicating but also to meet any who are interested in poultry matters for the purpose of giving demonstrations and advice, and it is to be hoped breeders will take full advantage of Mr. Truter's visit. The work of the Salisbury Poultry Club is perhaps not so well known as it might be, and we may say that the existence of a "live" club of this kind is of the greatest value to the industry, and it deserves the support of every farmer in Mashonaland. The Hon. Secretary is Mr. H. S. Logan, Box 76, Salisbury.

Sale of Stud Cattle.—On the 4th of April a sale of considerable interest took place at Nyabira siding, when a number of pure-bred and grade Sussex cattle—the property of Mr. L. Glanfield, of Ballineety Farm—were disposed of by public auction. A number of young bulls, varying from 11 to 18 months old, were disposed of at prices from 50 to 77 guineas, whilst half-bred Sussex heifers made up to £10 15s. At the same time three Friesland bulls from the Government experiment farm were sold at prices from 20 to 43 guineas. The Friesland breed ranks next to the Shorthorn in point of numbers in Rhodesia at the present time, and although Sussex are comparatively few as yet in Rhodesia, it is interesting to observe how rapidly they are gaining in public esteem as ranching cattle.

Salisbury White Maize in Australia.—The following interesting paragraph is taken from the *Agricultural Gazette* of New South Wales for the month of March, 1917, pages 162 and 163:—

> "An accidental cross between Hickory King and Boone County White was discovered at Yanco in 1914, and is being persevered with in a type which has the small core and hard, medium-large grain of Hickory King, but without the rounded grain and the large spaces between the rows of that variety, having in place of these characters the deep wedge-shape grain of Boone County White. This cross-bred was tried at Bathurst experiment farm on the upland last season, but owing to its lateness for this district, and the long time necessary to make it earlier by selection alone, it is being still further crossed on to Silvermine, which is much earlier. The original cross is now being grown at Wollongbar, in place of Hickory King. The increased vigour shewn by cross-breds in the first generation entitles the question of raising of cross-bred seed to some consideration."

An illustration accompanies the paragraph shewing the original parents and the cross produced, which is a twelve-row cob strongly resembling our own Salisbury White, which is, of course, derived from the same combination of the American

varieties—Hickory King and Boone County. It will be interesting to watch the subsequent development of this type in Australia.

SHORTAGE OF FARM SUPPLIES.—The restriction now placed on the export from the United Kingdom of a very formidable list of goods must affect agriculture in the Colonies. The restricted list includes agricultural machinery, dairy utensils, tools and fertilisers. Even the manufacture of farm machinery for export is being discouraged. Permission to import to Rhodesia may, however, be obtained in exceptional cases, particularly where material is urgently needed for repairs or for maintaining the continuity of existing industries. Proof will have to be given that every other means of meeting the situation have been exhausted, and a certificate obtained from the Priority Certificates Commissioner, at the office of the Secretary for Mines, Salisbury. The question of actual import will more generally be the concern of the merchant, but the farmer himself will be well advised to bear in mind that it will be difficult to replace losses and repair breakages on the farm during the continuance of the war, and he will best meet the situation by the practice of the very strictest care and economy until normal times return.

FARMERS' DIRECTORY.—We are publishing this month a list of the farmers of Southern Rhodesia with their farms and addresses, which it is thought will prove of considerable value to farmers, merchants and others in the course of their business. We shall be greatly obliged if any farmer whose name does not appear in the list will write to the Director of Agriculture making good the deficiency. Also, wherever the particulars against any name are incomplete or incorrect, we shall be glad to be advised of the mistake by anyone who notices the error.

FARM STATISTICS.—Reports of recent meetings of farmers' associations and letters in the daily press from country correspondents give evidence that the live stock and crop statistics

published by the Agricultural Department are being extensively studied by the farmers. It can be seen also that the figures are being collated and compared in a most satisfactory manner, and speakers are using them at their meetings for the purpose of stimulating local production and promoting healthy emulation between districts. From year to year the statistics published increase in accuracy and completeness. In theory they could be made almost perfect if the farming community will lend their aid in two directions. Firstly, there are probably a few farmers and stockowners whose names and addresses we have not yet secured, and we now request any such, who do not regularly receive statistical forms, to communicate with the Statistician, giving full names and addresses, as well as the names of their farms. Secondly, there are still some farmers, very few in number, who neglect to return the statistical forms sent to them, and it seems a pity that the value of the published figures should be reduced by the wilful omission or carelessness of a small minority. In some cases a fairly large producer has failed to furnish a return, with the result that his district is penalised in the tabulation to the amount of his production, and suffers to that extent in comparison with other districts. As a last resort, it may become necessary to put the machinery of the law in force in order to bring one or two recalcitrant farmers into line, but we are sanguine enough to hope that the pressure of local public opinion may produce the desired effect without the use of extreme measures.

We wish here to acknowledge with thanks suggestions for amending and improving our statistical return forms and the tables in which the results are published. All suggestions are welcome, and receive careful consideration.

THE LATE MR. GEORGE PINCHIN.—It is with very deep regret we have to record the death of Mr. George Pinchin, M.R.C.V.S., Government Veterinary Surgeon, who died at Bulawayo on the 12th of May from enteric fever followed by complications. Mr. Pinchin had been a member of the Government Veterinary Staff since 1910, where his professional capabilities were greatly valued by the Administration and his

colleagues, whilst the courtesy, attention and skill he displayed as a practitioner were recognised and esteemed by the public. He leaves a widow and child, to whom our sincere sympathy is extended.

CORRECTIONS.—The following errors appeared in Mr. C. H. Pead's article on "Cicadas" in April *R. A. J.*:—Page 246, for "Cossidæ" read "Coccidæ"; wherever the word "nostrum" occurs throughout the article, read "rostrum."

In the article on "Cultural Notes on Rhodesian Crops," on page 237 of April *R. A. J.*, for "10 boxes (potatoes) or 60 bushels," read "10 boxes or 17 bushels."

In the article on "Rhodesian Farm Orchard," the word "Boulhretieu" on page 194 of April *R. A. J.* should read "Bon Chrètieu."

ACKNOWLEDGMENT.—We regret that when publishing the following photographs in the February *R. A. J.*, we omitted to mention that we were indebted for them to Mr. A. Howat, of Umtali:—Photo of Mr. English's Friesland bull opp. p. 24, and "Blasting by Electricity," opp. p. 72.

Extracts from the Report of the Director of Agriculture

FOR THE YEAR 1916.

CONDITIONS OF AGRICULTURE.—The far-reaching influences of the war have been felt throughout the year, and have deeply affected every aspect of rural life and industry in Southern Rhodesia.

The pastoral and agricultural industries have suffered loss and inconvenience, but less than might have been expected. Progress has to some extent been suspended, the increase in settlers has almost stopped, supplies such as implements, machinery and fertiliser have been hard to obtain, and prices of farming requirements have risen. On the other hand, producers of foodstuffs, grain and meat have not profited by the high prices to the same extent as farmers in other parts of the world. The most serious effect of the war, however, has been the absence of so many farmers from their homes on active service, some unhappily never to return. Yet even so, in view of the magnitude of the upheaval, the disturbance seems to have been felt less here than elsewhere. Such progress as can be recorded is a proof of the ability of the country to withstand the paralysing effects of the war. The number of farms under actual beneficial occupation is 2,178, as against 2,145 last year, and 2,042 in the year before. Many farms are being carried on for men away at the front, and supervised by neighbours left behind, and these are, of course, not as fully utilised as if their occupants were here to manage them themselves.

The season was by no means a favourable one. Not only was there a shortfall in the rains, but the distribution of these was unfortunate, a break occurring at the very season of most active plant growth, whilst the late rains when they did come were in many parts of the country wholly inadequate. Crops

were in consequence generally light, and the grass and water supply would have been inadequate but for the fortunate circumstance that the winter was mild and favourable to the stock, and was followed by exceptionally early spring rains.

Several points of instructive importance emerged from a study of this season of trial. The failure of natives to raise crops of maize where Europeans have succeeded demonstrates the value of enlightened methods, particularly in the direction of systematic cleaning and cultivation. On the other hand, a most significant fact is that where native plantings of maize have quite failed, crops of indigenous grain have at least partially succeeded; for instance, inyouti, rapoko and kaffir corn. This seems to shew that, as a reliable stand-by for stock feeding, more attention should be paid to these native grains, which yield results on soils that are unsuitable and in seasons that are fatal to maize. Further, the fact that early plantings have sometimes scored over late again emphasises the necessity for organising farm work so that early planting may be secured. The reports also shew the immense value of black, bottom lands in the mealie belt, for on these good crops were standing when adjacent red land, under identical treatment, had suffered heavily. Another useful pointer for the arable farmer is to note that ground nuts appear to have withstood drought better than grain crops. On the other hand, in this erratic season in some districts it was only the very late sown crops, intended originally for silage, that escaped the check of the February drought, and these gave the best returns obtained. This element of chance cannot be escaped, and is indeed characteristic of the farming industry the world over. The rainy season, which normally commences towards the end of the calendar year, on the other hand was particularly early, and enabled an excellent commencement to be made for the new season, sowing and early cultivation being carried out under exceptionally favourable conditions all over the Territory.

Speaking generally, the veld has been good, and springs, water holes and rivers sufficient for stock, which suffered very little even in districts where crops failed for want of moisture at the critical time. That the grass was less rank than usual, owing to the same causes that affected the crops, was no loss, but the reverse.

Veld fires during the winter did much mischief in certain districts, although there are visible signs of a tendency, by co-operation amongst the farmers and with the help of the Native Department and the natives, to take effective measures to deal with this trouble under the Herbage Preservation Ordinance.

Harvests were fairly good in the south-eastern and eastern sides of the country, but very poor in the western and midlands, while in the northern districts, where arable farming is more largely followed, they may be said to amount on an average to only about two-thirds of a full crop. The shortfall of natives crops was such that it was necessary for the Government to supply the natives in certain districts with grain, both for their sustenance and for seed for next season.

At a time when the farmers throughout the Empire are being urged as a national duty and patriotic obligation to produce every description of foodstuff to the utmost extent possible, the Rhodesian producer finds himself with a surplus of foodstuff for sale, and desires an outlet for his grain, beef, butter, tobacco and oranges. The need of export arises at the very moment when the world's market is most in want of supplies. To reach the distant markets of the world two essentials are necessary: first, co-operation to secure sufficiently large consignments to command consideration; and secondly, conveyance for our goods by land or sea at reasonable rates. The effect of these influences is seen in the activities of our four co-operative societies handling maize, in our tobacco growers' co-operative society, in our butter, bacon and oil factories, and in our export of cattle to the south. Other projects are as yet only under discussion, notably a meat canning industry and the establishment of co-operative societies of wheat growers and the erection of flour mills.

The statistical returns regarding live stock and crops shew that the country, in spite of war conditions, is progressing steadily, and that those farmers who have been unable to proceed to the front have at any rate kept up production, and maintained our herds and flocks, our acres and orchards in an active thriving state. This fact is demonstrated by the following figures, indicating the area under European cultivation in Southern Rhodesia in each of the past three years:—

Season.	Acreage under all crops.	Increase, in acres.	Percentage, increase.
1913-14	161,268	...	...
1914-15	183,407	22,139	13·7
1915-16	202,946	19,539	10·6
1916-17	254,702	51,756	25·5

Similarly, the figures for live stock referred to in detail elsewhere shew in the aggregate a very notable increase. The returns furnished as at the end of each year are as follows for cattle:—

	Number.	Increase.	Increase, per cent.
1914—European owned ...	341,878	...	...
Native owned ...	406,180	...	...
Total ...	748,058	...	...
1915—European owned ...	394,856	52,978	18·4
Native owned ...	446,070	39,890	9·8
Total ...	840,926	92,868	12·4
1916—European owned ...	468,504	73,648	18·6
Native owned ...	491,522	45,452	10·2
Total ...	960,026	119,100	14·2

For sheep, the corresponding figures are:—

	Number.	Increase.	Increase, per cent.
1914—European owned ...	67,238	...	...
Native owned ...	257,006	...	...
Total ...	324,244	...	...
1915—European owned ...	50,222	−17,016	−25·4
Native owned ...	261,593	+ 4,587	+ 1·8
Total ...	311,815	−12,429	− 3·8
1916 – European owned ...	62,371	+12,149	+24·2
Native owned ...	294,996	+33,403	+12·7
Total ...	357,367	+45,552	+14·6

For goats, the following are the figures:—

	Number.	Increase.	Increase, per cent.
1914—European owned ...	35,317	...	...
Native owned ...	639,473	...	...
Total ...	674,790	...	...
1915—European owned ...	26,518	− 8,799	−25·0
Native owned ...	661,867	+22,394	+ 3·5
Total ...	688,385	+13,595	+ 2·0
1916—European owned ...	30,189	+ 3,671	+13·8
Native owned ...	693,255	+31,388	+ 4·7
Total ...	723,444	+35,059	+ 5·1

Labour conditions, which were at first favourable, have latterly suffered somewhat, owing to a scarcity of native labourers from the north, and the continual difficulty of inducing the local native to come out and work, and to remain long enough when he does so to become a valuable labourer. A general movement for support to the Labour Bureau by guaranteeing to draw a certain proportion of every farmer's labour through this agency on certain conditions promises to meet with success, and is being well received in all parts of the country.

No legislation of an agricultural character was passed last year, shewing that for the present we appear to have adequate laws for the needs of the farming industry, although no doubt as the country progresses amendment may from time to time be called for, as new conditions demand new treatment.

Live Stock.—The position of the cattle industry, in spite of a few drawbacks, is thoroughly sound and satisfactory. Numbers increase steadily, as indicated above, and mortality is, as compared to other countries, very low. The net increase has been high, in spite of a new and satisfactory cause of diminution in the form of export of slaughter stock. The large numbers now reached amply justify the steps that are being taken to establish a beef industry, be it in the form of canned meats and extract or as frozen carcases.

The number of brands of ownership now registered in the country is 6,135, about one-quarter being in the names of natives.

An event of considerable importance during the year was the opening up of Johannesburg as an outlet for fat stock from Matabeleland. Much use has been made of this, to the evident advantage of farmers in the south and west, and also apparently to the satisfaction of buyers. The number of cattle so exported during the year was 12,719, valued at £112,003. Export to the railway terminus in the Transvaal Province across the Limpopo River, as well as by rail from Bulawayo, has been arranged. This outlet has had a steadying effect on the price of slaughter and breeding stock generally. Some of our fat stock has been shipped in frozen condition to London as an experimental shipment, and reports

concerning its quality and condition are very favourable, and prove that Rhodesia can produce beef quite suitable for the Home trade.

Progress has been made with the preliminary arrangements for the establishment of a canning factory in the northern part of the Territory, which is out of reach of the southern outlet under present conditions. The erection of modern stockyards is being seriously considered at Bulawayo and Salisbury, with a view to developing the cattle trade in whatever direction it may appear most promising, whether as a canning and meat extract industry or for the export of frozen beef, or of live animals, as at present. The first need in any event is facilities for the handling, selling and railage of cattle, and this is being provided. The importation of meats—fresh, frozen and preserved—including hams and bacon, which for the past seven years has been dwindling, continues to shew a marked diminution, and the returns for the past three years are instructive.

Year.	Lbs.	Value.
1914	1,530,610	£46,595
1915	728,508	£27,375
1916	276,259	£14,275

To this might be added the imports of sheep, the great bulk of which is for immediate consumption, and amounts to 22,385 head, valued at £14,297, bringing the total to £29,192. Even so, this figure is only about one-quarter of the value of our sales of slaughter cattle to the Union, so that in respect of meat, as of maize, our trade balance is well on the right side.

The calving season which started in September proved a very fortunate one, and mortality has been distinctly under the average. Farmers are shewing a marked preference for improved cattle, and, whilst grade cows and heifers are in strong demand, inferior and native stock are less marketable than formerly. The stall feeding of oxen is increasing in the districts where arable farming is chiefly followed, and the Department has given special attention to cattle feeding experiments on the Gwebi experiment farm, to determine the best means of utilising maize and artificially grown fodders, and to ascertain the most profitable methods of fattening cattle. These experiments have aroused much interest, and

the practice of stall feeding is becoming more and more frequent. After negotiations, the Administration of Northern Rhodesia has assented to cattle from Southern Rhodesia being conveyed through that Territory into the Belgian Congo, but subject to certain safeguards and conditions more severe than are imposed by the Union, and not required by the country to which the animals are consigned.

The most pressing need of the country at the present time in this connection, and one deserving most earnest consideration, is undoubtedly an adequate supply of well-bred bulls, and although large numbers are being imported, both from the Union of South Africa and from overseas, and some good animals are being locally bred, the demand still very much exceeds the number available, and further improvement is being retarded for lack of good bulls. The importations numbered 376 pure-bred bulls and 1,493 heifers, including 85 high-class bulls and 116 heifers from overseas, and 291 bulls and 1,455 heifers from the Union.

A serious weak spot in our position as a beef-producing country lies in the quality of our breeding herds. In spite of the very creditable efforts of individuals, as demonstrated at our agricultural shows, the present insignificant numbers of superior animals cannot exercise the requisite influence on the overwhelming numbers of inferior cattle. The supply of pure-bred bulls of even moderate quality is entirely inadequate to the demand, and breeders are compelled to employ cross-bred and inferior bulls for want of better. Pure-bred cattle of European breeds now number 3,470, and in addition there are 1,804 Afrikander cattle, so that improvement of the native stock is, although inadequately to their numbers, being provided for to some extent. There are now 1,266 Shorthorns, 933 Frieslands, 477 North Devons, 384 Herefords in Southern Rhodesia. Other European breeds are represented in much smaller numbers, but Aberdeen Angus are rapidly gaining in popular favour, and some attention is also being paid to Ayrshires and South Devons.

The production of milk, butter, cheese and eggs shews satisfactory increase, and at the present rate the time for seeking markets beyond our borders cannot be far distant.

With a steady increase of a suitable class of dairy cows,

the milk supply of the country is being more adequately met than hitherto, and there is simultaneously evidence of a growing desire on the part of farmers to learn the arts of handling milk and cream, and making butter and cheese.

The pig industry has lately gone ahead very rapidly, and the bacon factory, erected a couple of years ago, has been much enlarged in order to cope with the constantly increasing numbers of pigs received. The number of pigs returned as at the end of each of the last three years is respectively 13,119, 19,650 and 22,974, shewing a steady increase. During the year the Union agreed to permit swine from Southern Rhodesia to be imported, as there was no justification on veterinary grounds for their exclusion. We therefore can now have recourse to the southern markets, should our own not suffice, for the rapidly growing supplies of pigs.

The practice of dipping, which has been a notable feature of recent years, has made more progress than ever before. The recently passed Compulsory Dipping Ordinance is being adopted very readily, and is now in force or in process of being applied by voluntary request to almost every district in the country. As an indication of the activity being shewn in this direction, it may be mentioned that for the last three years the number of dipping tanks was respectively 427, 595, and is now 761, whilst many are in course of erection. It is quite a general practice for two or more farmers to dip their cattle at the same tank, although there is a marked desire for every farmer to have his own tank. The natives, who still own a majority of the cattle in the country, shew a remarkable willingness to adopt the practice of universal dipping, and have, with the encouragement of the Native Department, combined to erect numerous tanks, included in the above returns, in their reserves. It is impossible to exaggerate the benefits of this most useful practice. Owing to exigencies caused by the war, there was a partial failure in the supply of dip during the year. To meet the difficulty, our stocks of arsenite of soda held in reserve against locust invasion were drawn upon until such time as the proprietary dips, of which there are now two brands on the market, were again forthcoming.

Cattle crossing our borders from Tati and Bechuanaland are summarily destroyed as a protection against the introduc-

tion of pleuro-pneumonia and other contagious diseases, and as a preventive against cattle running. During the past year 187 head were dealt with, and it is to be noted that of these only 20 came through the border fence, and all the rest crossed at the Maitengwe section, where the Pandamatenka Road, which constitutes the boundary, is unfenced, thus vindicating the utility of the fence, which has at times been questioned. Of these cattle, whilst many no doubt strayed through the negligence of their owners, no fewer than 38 head are officially recorded as illegally imported.

The state of the country as regards animal diseases is discussed in the report of the Chief Veterinary Surgeon, which conveys a general impression that conditions in this respect give no cause for alarm. Outbreaks can be dealt with as they arise, especially if caught at a sufficiently early stage, and in variety of diseases, numbers of outbreaks and mortality, we are in a fortunate and satisfactory position.

Veterinary research continues, and although much time is taken up by microscopic diagnosis and other laboratory work of a routine nature, progress can be reported, especially in the investigation of horse-sickness and the inoculation of imported cattle. During the year provision was made for the commencement of the erection of much-needed new veterinary research laboratories and a site selected, and it is hoped that construction may shortly commence. Experimental immunisation against horse-sickness has been attended with a very large measure of success, and is being systematically applied to the Police horses, which can be kept under proper observation, with a view to ascertaining not only the recovery from treatment, but also the resistance to natural infection during the subsequent horse-sickness seasons. Immunity against lethal doses artificially conveyed is fully proved. There is every reason to hope that a practical preventive has now been secured, and as evidence of this accumulates, it will exercise a far-reaching influence on questions of transport and mobility in country districts, and also open a fresh field to the farming industry, as, apart from this one dreaded scourge, Southern Rhodesia seems to be admirably suited for successful horse breeding.

(To be continued.)

New Crops for Rhodesia.

A report on some of the new and recent crop introductions at the Agricultural Experiment Station, Salisbury.

By J. A. T. WALTERS, B.A., Assistant Agriculturist.

The total number of new or recent crop introductions dealt with at the Experiment Station, Salisbury, during the last few years exceeds two hundred. The vast majority of them have never succeeded in adapting themselves to Rhodesian conditions, although they are sometimes retained for trial during several seasons. Some of these are plants of great economic importance in their native countries. Such are the clovers and lupins of Europe, the cowpea varieties of America, some of the best hay grasses of Australia, and many wheat varieties from all parts of the world. In other cases again imported plants and grain have done remarkably well, and promise to become a great source of wealth to the farmer. It must not be forgotten that agriculturally Rhodesia is naturally deficient in indigenous crops, although full of possibilities, and it is with a view to taking advantage of these possibilities that new crops are being constantly introduced for trial, and, when successful, are propagated on a sufficiently big scale to enable distribution among farmers for further experiment to be undertaken.

PASTURE PLANTS.—This is perhaps the line along which greatest progress has been made, and the total number of valuable grasses and legumes which seem to have adapted themselves to cultural treatment in this country amount to nearly a dozen. In every case they are of the coarse type, and up to the present no success has been obtained with the finer grasses forming a thick sward which are so typical of English meadows and produce suitable grazing for sheep.

In addition to Napier's fodder, which is the coarsest and most productive of our grasses, two imported grasses of the same type have shewn great promise. These are Indian cane and cow cane introduced from Australia. The former, as will be seen in Fig. 1, is similar to Napier's fodder, but shorter in growth and more succulent in the stem. Cow cane is still shorter and more succulent. These plants are destined in course of time to supplement or even replace Napier's fodder as a source of ensilage material or winter grazing. Guinea grass (*Panicum maximum*) has been repeatedly noticed in these pages. It is proving very successful experimentally as a coarse pasture or hay grass. Two native grasses, both *panicum spp.*, have been isolated and grown as pure stands. They shew great promise both for hay and pasture, being fine in leaf and straw, and producing heavy yields of fodder. One of these is illustrated in Fig. 2. A trial cutting in April gave over three tons of dried hay per acre. Of all the hay grass, however, none has yet equalled molasses grass (*Melinis minutiflora*) for wealth of succulent foliage. This grass forms a dense mat on the surface, reaching in places to over 3 feet high. As it flowers very late in the season, it is best cut for hay in April or May, after the rains are over. It is illustrated in Fig. 3, which gives some idea of its luxuriance. A trial cutting in April last gave approximately five tons of dried hay per acre. This extraordinary weight can, however, only be expected from pure stands that have received some attention. This stand was planted out in February, 1916. Sudan grass (*Andropogon garawi*) has again done well as a hay grass. A plot sown on the 13th December was cut for hay early in March, yielding 2,164 lbs. of hay per acre. The second cutting off the same plot is shewn in Fig. 4, and was ready for cutting at the end of April, standing over 3 feet high at that date. One low-lying spreading grass received from Mr. J. Meikle, Umtali, has done very well at the experiment station. It is hardly 6 inches high, but the runners are several yards long. Its feeding value has not yet been ascertained.

Of other pasture plants Spek boom (*Portulacaria afra*), received from the Mzondo Mission, Victoria, and plentiful in certain portions of the Cape Province, has made but little growth. So also has a salt bush, a plant much liked by cattle.



Fig. 1.—Indian Cane at Salisbury Experiment Station.



Fig. 2.—A Native Grass (*Panicum sp.*) which has shewn great promise at Salisbury Experiment Station.



Fig. 3.—Molasses Grass (*Melinis minutiflora*) at Salisbury Experiment Station.



Fig. 4.—Sudan Grass at Salisbury Experiment Station, May, 1917, after first cutting in April.

Beggar weed (*Desmodium tortuosum*) continues to give satisfaction, and in its second year gave two cuttings of hay. Of the various other pasture plants tried, the only ones that call for mention are the white seeded velvet bean, from Miss Bovill, Marandellas, and a species of Dolichos bean from Col. Leonard, Gwelo. The new velvet bean is shewn in Fig. 5, from which it will be seen that the pods are distinctly longer and more numerous than in the ordinary velvet bean. The foliage is also reputed to be stingless. This variety will be propagated with a view to distribution in the near future, as it seems to be a distinct improvement on the ordinary variety. The Dolichos bean is a rival as a leguminous fodder plant to the velvet bean, and of the numerous varieties tried at Salisbury, this seems so far to be the most promising.

Fig. 6 shews a method which is a variant on the usual one of planting out Napier's fodder, the idea being to plant a low growing grass like Guinea grass alternately, and in addition to have one or more legumes. This arrangement met with considerable success, and was devised in order to give a greater variety of food, and, by the inclusion of legumes, a more complete ration. The bulk of the growth of Napier's fodder can advantageously be used for ensilage in March or April, the aftergrowth forming a pasture for feeding during winter.

Grain Crops.—The original plot of dhal (*Cajanus indicus*) is now in the fifth year, and, as will be seen from Fig. 7, the loss in plants has been comparatively small. During the four years of its existence, about 14 bags per acre in all have been taken from it, and the present crop seems to promise at least 2—3 bags per acre. This plot will be retained as long as a payable yield of grain is likely to be obtained from it. Several new varieties of early dhal introduced from India are now under trial. Of these, one sown as late as the 28th December was in full bloom on the 1st April. The plants, however, are very much shorter than the ordinary dhal, and the yield of grain is likely to be considerably less. It is hoped that some of these early varieties will enable this crop to be grown in localities where the prevalence of early frosts has prevented the ordinary variety from setting seed.

At the Entomologist's suggestion, a plot of cowpeas was

sown early in November in the hope of escaping the attacks of the stem borer. This proved ineffective, every plant being attacked in the usual way. It is to be noted that certain farms in various parts of the Territory seem to be entirely free of this pest, and are able to grow heavy yields of this valuable grain and soil-renovating crop.

A crop of mung (*Phaseolus mungo*), an Indian leguminous crop, has done remarkably well. This is an annual bean, resembling the ordinary lentil. The only drawback so far apparent is that the seeds ripen unevenly, but the yields are good, and the grain can be used both as human and cattle food.

The tepary bean, famed in the Western States of America for its drought-resisting properties, has done better this season, and a quantity of seed has been saved. It remains to be seen how this acclimatised seed will do under our conditions.

Miscellaneous.—A new oil crop, known as Chili oil seed (*Madia sativa*), has proved exceedingly successful at the agricultural experiment station, as Fig. 8 will shew. The plants average about 18 inches in height, and bear thistle-like flowers in profusion. This success is the more remarkable as both linseed and *Sesamum indicum* have practically failed this season. Niger oil seed (*Guizotia oleifera*) has consistently done well under Rhodesian conditions, and will grow thickly a second year from volunteer seeds. Oil crops on the whole have done well in this country, and the number of varieties that can safely be recommended is considerable.

A crop of madumbies (probably *Colocasia esculenta*), resembling sweet potatoes, promises to give a very fair yield of good tubers. This would seem to be well adapted for pig food, the tubers being also eaten by some of the native races. The tubers keep well when dug out of the ground.

Success was obtained with a crop of Jerusalem artichokes by planting in October under irrigation. There were frequently as many as 50 tubers on a root, despite the fact that no manure had been applied. On account of the difficulty of keeping the tubers, planting has to be done as early as September or October. The tubers may, however, be left in the ground with safety until sufficient rain has fallen to cause

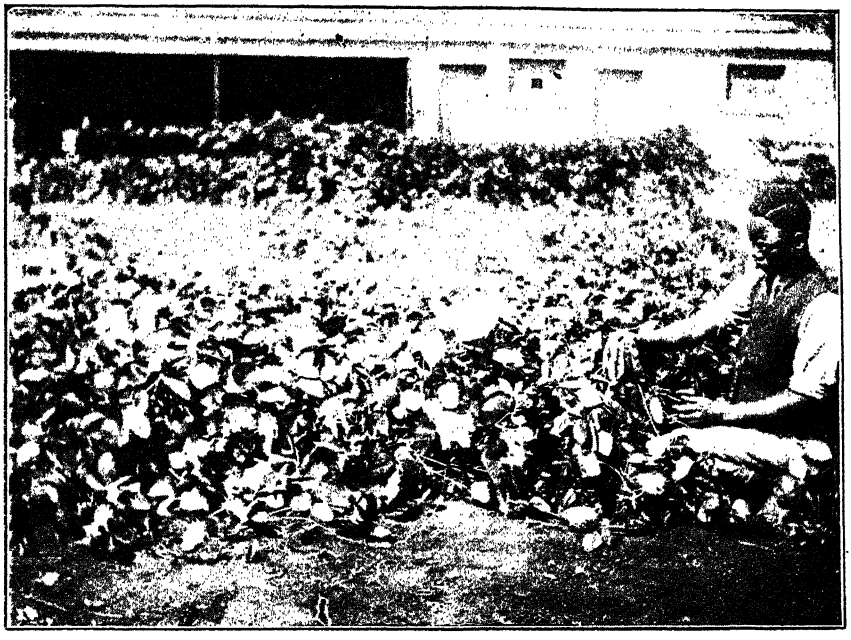


Fig. 5.—White-seeded Velvet Bean at Salisbury Experiment Station.



Fig. 6.—Napier's Fodder, Guinea Grass and Dhal, grown in alternate rows, at Salisbury Experiment Station.



Fig. 7.—Dhal (*Cajanus indicus*), in its fifth year, at Salisbury Experiment Station.

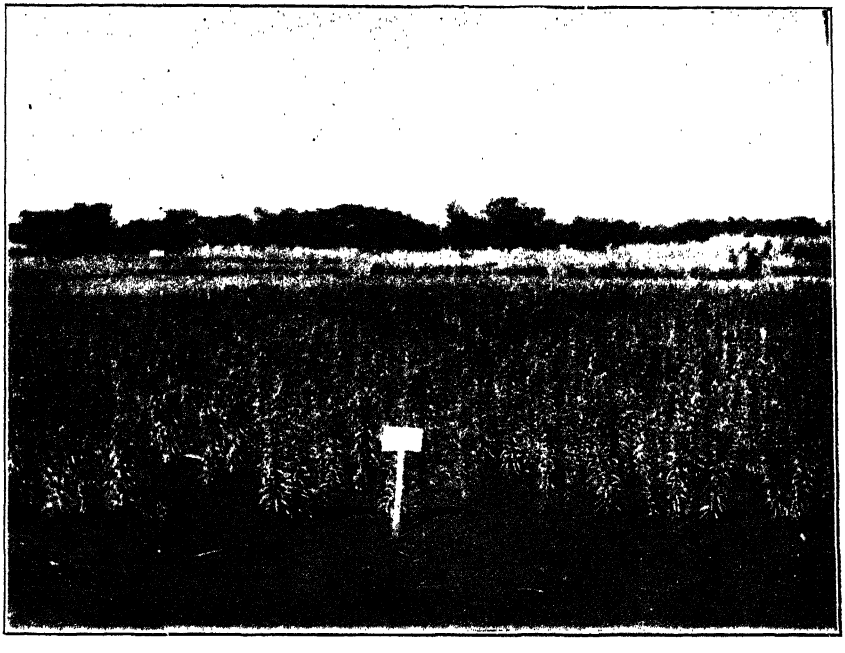


Fig. 8.—Chili Oil Seed (*Madia sativa*) at Salisbury Experiment Station.

sprouting, when they should be planted out to their permanent positions.

Sunn hemp (*Crotalaria juncea*) has consistently done well at Salisbury. This remarkable green manuring legume grows to a height of 6 feet or more, and furnishes one of the fibres of commerce. Its root system is usually covered with nodules. It has, however, no feeding value, and the fibre, although favourably reported on, has not yet been exploited in this country.

(*To be continued.*)

Dates of Rhodesian Agricultural Shows, 1917.

Victoria, 23rd and 24th May.
Bulawayo, 29th and 30th May.
Rusape, 20th July.
Umtali, 21st and 22nd June.
Gatooma, 27th, 28th and 29th June.
Gwelo, 4th and 5th July.
Salisbury, 26th and 27th July.

How to Build a Cattle Crush.

TWO METHODS.

I. BRANDING SQUEEZER.

We are indebted to Mr. J. H. Fleming, General Manager of the British South Africa Company's Rhodesdale Ranch, for the following account and description of a special form of crush pen, a "squeezer," which has been used on the estate and has given great satisfaction. We give two photographs of the squeezer in actual use for branding cattle, and one photograph of a small model that embodies certain improvements.

This cattle squeezer was invented by a "handy-man cowboy" who worked for some years on the ranch in the Texas Panhandle, managed by Mr. Richard Walsh for so many years. Other models in use up to that time all had the objection of one side being stationary, giving an uneven pressure on the animal, difficulty in control over its struggles because of this, and allowing the beast to lie down in the squeezer. Injury to the hips, broken legs and various accidents often resulted. As cattle became more valuable, it was imperative that they should be branded, dehorned or castrated with the least possible work and trouble, and in the most careful manner. This squeezer was generally admitted to fulfil these conditions, and has been much adopted in the western States, and at, I believe, some of the large stockyards at live stock markets. The narrow floor space, even pressure of both sides and properly adjusted lever power permit all these operations to be performed with a minimum of effort and a maximum of safety to the operator and the animal. The door at the outlet serves for any dehorning to be done, by space being made for the animal's head to protrude.

The main use for the cattle squeezer is for branding pur-



Branding Squeezer in use.



Branding Squeezer in use.

poses, as castration is done when the calf is too small for it to be of use, and dehorning in Rhodesia has not yet reached an important stage. The squeezer will also be found useful for treating and dressing wounds, etc.

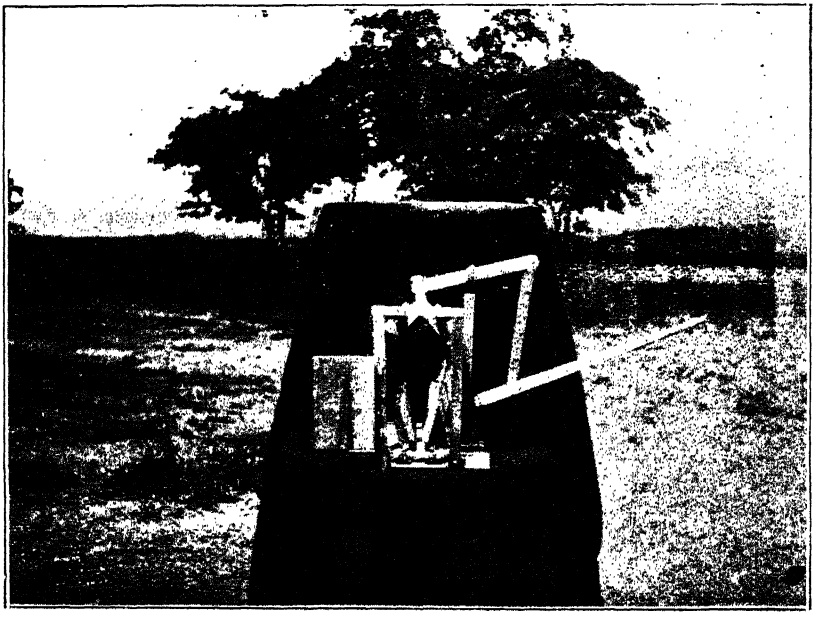
In erecting one of these squeezers, the timber used should not be too heavy, as it becomes unwieldy. Two ordinary boys can work the lever quite easily, and the various hinges and joints should move freely. Iron piping is used on the upper parts of the sides, being more readily adjustable to the needs of the branding and cannot get burned by the irons. An iron pipe or wooden bar should be put behind the animal quickly, immediately it gets into the squeezer, the tendency being for the animal to back out as soon as it feels the least pressure. The labour necessary is one boy on the door, two boys on the lever, one at the fire keeping the irons hot, one at the entrance end of the squeezer to put the bar behind the animal (this can be done by the man doing the branding if boys are scarce) and two in the crowding pen to work the cattle up the chute to the squeezer.

On one estate, where one of these squeezers has been erected, the writer branded 45 young bull calves in one-third of the time it took to brand 12 head at the same place on a former occasion, when they had to be roped and thrown. Its use does away with the "rough and tumble game" so injurious to the animal and labour-consuming to the owner.

Description of Cattle Squeezer.—Commencing with the bottom, the sleepers should be 4 in. x 4 in. x 8 ft. These sleepers should be laid in pairs—two at each end and two in the middle, about 12 in. apart. Across the sleepers a floor about 5 ft. wide of 2 in. x 8 in. hard-wood, with short cross pieces to prevent the cattle from slipping, should be laid the full length of the crush, leaving about 18 in. of the sleepers projecting out past the floor at each side. The reason for this projection is that it may be found necessary to anchor these ends to posts to keep the crush from rocking. After the floor has been nailed down, and the outside plank on each side of the floor bolted down to the sleepers, the main uprights should be put up. These consist of two 3 in. x 6 in. teak boards 8 ft. 6 in. in length, and should have a slight bevel at the bottom where

they are bolted on to the inside side of the middle sleepers. If they have this bevel at the bottom—they being 6 in. apart there—they will come together at the top, and they should each be bolted by two ½ in. bolts at the bottom, with the nuts outward. At the top two pieces of 3 in. x ½ in. iron should be bolted, and should be shaped as in the model, with a straight projection of 12 in. from the end of the wood. The main upright should have a strong iron brace placed in much the same position as the wire on the model.

One improvement on the model crush is that it works above the floor, whereas the crush we are using works underneath. This is done by means of six iron adjustable hinges, three on each side. These hinges should be made of 3 in. x ½ in. iron and be about 24 in. long, with a ½ in. groove down the centre. In bolting these hinges down, care should be taken to see that the bolts come up through the sleepers and the floor, and that the bolts be driven from the bottom of the sleepers so that the nuts will be on the top. The object of this groove is that, should the width of the crush have to be altered at any time, the nuts on the bolts can be partly unscrewed, and the hinges can thus slide either way, in or out, as may be required. I would suggest that a 1 in. pipe be passed through the eye end of the hinges and through the ends of the uprights on the sides of the crush. The bottom ends of the uprights, where the pipe or rod passes through, should have a piece of ¾ in. x 2 in. iron over the end and bolted about 6 in. from the end, and in this way make a clamp to prevent the wood from splitting. The top ends of the uprights should have a ¾ in. x 2 in. strap of iron on each side, which should be 12 in. long and bolted by two ½ in. bolts, and should project 6 in. from the end of the wood, with a ⅝ in. bolt hole 2 in. from the end of the iron. These uprights should be of hard-wood and measure 5 ft. x 4 in. x 4 in., and with the 6 in. projection of iron on the top end should be not less than 5 ft. 6 in. in length. After the uprights have been put in place, they should be boarded to a height of 2 ft. 10 in., with 2 in. x 8 in. boards close together, leaving a space of 2 in. at the bottom, so that any mud which the cattle may carry in when passing through the crush can pass out at the sides. Above the wooden sides four 1 in. iron pipes should be placed and held in position by 1 in. iron pipes or bars, with a bolt at each end passing



Model of Cattle Squeezer.

through the 4 in. x 4 in. wood upright. These bolts should have the nut on the outside, so that the cross iron pipes can be lowered or heightened as may be required by partly unscrewing the nut of the bolt that holds the upright iron bars or pipe in position.

The overhead pieces should be made of 2 in. x 4 in. hard-wood 15 in. long, with an iron bar $\frac{3}{8}$ in. x 2 in. x 30 in. to project 6 in. at the lower end and 9 in. at the top end; the iron at the top end to have a curve inward to meet the irons on the other side. If these irons are curved inward, they will prevent the wood of the overhead coming together before the crush is closed. All the bolts where the irons join should be $\frac{3}{8}$ in. After the overhead pieces have been put in place, two 2 in. x 4 in. hard-wood boards should be bolted across them at each end of the wood.

The cross tree should be made of 4 in. x 6 in. hard-wood, 8 ft. in length, and should have three $\frac{3}{4}$ in. bolt holes drilled through it, one at each end, 3 in. from the ends. The centre hole should be 40 in. from the bolt hole through the inner end and 50 in. from the bolt hole through the outer end. The cross tree should then be placed across top of main upright and bolted to the 12 in. irons projecting from top end of main upright with the short or 40 in. end of cross tree, right over the top of the two centre overheads. These two should be connected by two $\frac{3}{4}$ in. x 2 in. iron straps with two $\frac{5}{8}$ in. holes in them 12 in. apart.

On the other end of the cross tree there should be attached a 3 in. x 4 in. x 6 ft. 6 in. drop lever; this lever to have two 15 in. x $\frac{3}{8}$ in. x 2 in. iron straps bolted to the top end with two $\frac{1}{2}$ in. bolts, and to project 9 in. from end of wood. These iron projections to be bolted by $\frac{5}{8}$ in. bolts to long end of cross tree. The other end of drop lever to have two $\frac{3}{8}$ in. x 2 in. x 24 in. iron straps bolted to it by two $\frac{1}{2}$ in. bolts, and to project 18 in. from wood. These projections to have three $\frac{5}{8}$ in. holes drilled through them, so that they can be changed if required, where they are bolted to main lever.

The main lever should be made of 3 in. x 6 in. x 14 ft. hard-wood, and should taper to a round handle of, say, $2\frac{1}{2}$ in. diameter. The other end should have two $\frac{5}{8}$ in. x 3 in. x 24 in.

iron straps bolted to it by two ½ in. bolts, and should project 18 in. and be fitted between the two planks of the main upright about 9 in. above the top of the sleepers.

The gate at the exit of the crush should be hung on a post put into the ground 2 ft. 6 in., close to the sleepers, and should be about 4 ft. square.

In placing the crush in position, the ground should be dug out to a depth of 9 in., and about 5 in. of gravel or broken rock put in. Lay the crush on top of this, then tamp another 4 in. of rock or gravel around the sleepers. If this is done, the floor will only be about 2 in. above the level of the ground.

Material Required.—Lumber—6 hard-wood sleepers, 4 in. x 4 in. x 8 ft.; 7 hard-wood flooring, 2 in. x 8 in. x 10 ft.; 1 pine for cross pieces on floor, 1 in. x 2 in. x 10 ft.; 2 hard-wood main uprights, 3 in. x 6 in. x 8 ft. 6 in.; 6 hard-wood uprights on sides, 4 in. x 4 in. x 5 ft.; 8 hard-wood boarding for sides, 2 in. x 8 in. x 10 ft.; 1 hard-wood for six overheads, 2 in. x 4 in. x 10 ft.; 4 hard-wood to bolt to overheads, 2 in. x 4 in. x 10 ft.; 1 hard-wood cross tree, 4 in. x 6 in. x 8 ft.; 1 hard-wood drop lever, 3 in. x 4 in. x 6 ft.; 1 hard-wood main lever, 3 in. x 6 in. x 14 ft.; 3 hard-wood or pine for door, 2 in. x 8 in. x 12 ft. Bolts—26 ½ in. x 7 in.; 16 ½ in. x 8 in.; 28 ½ in. x 6 in.; 18 ½ in. x 3½ in.; 4 ½ in. x 4 in.; 1 ⅝ in. x 12 in.; 13 ⅝ in. x 6 in.; 12 ½ in. x 5 in. Iron—2 24 in. x ½ in. x 3 in. for top of main upright; 6 24 in. x ½ in. x 3 in. hinges, with eye end 1 in. clear; 1 1 in. x 1 in. x 8 ft. bar iron for brace for main upright; 10 1 in. x 10 ft. pipes for sides of crush and hinges; 4 30 in. x 1 in. pipes for clamps to side pipes on crush; 6 18 in. x ⅜ in. x 2 in. for lever end of crush uprights; 24 12 in. x ⅜ in. x 2 in. for upper end of crush uprights; 12 30 in. x ⅜ in. x 2 in. for overhead pieces; 2 18 in. x ½ in. x 3 in. connecting cross tree and overhead pieces; 2 15 in. x ⅜ in. x 2 in. top of drop lever; 2 24 in. x ⅜ in. x 2 in. bottom of drop lever; 2 24 in. x ½ in. x 3 in. bottom of main lever; 2 3 ft. strap hinges for gate; about 30 lbs. of 6 in. nails.

For the photographs of the squeezer in use, we are indebted to Mr. J. H. Fleming, and for the photograph of the model to Mr. W. H. Swain, of Premier Estate.

II. CHEAP CATTLE CRUSH.

By R. C. Simmons.

A cheap form of crush, as shewn on the accompanying diagram, may easily be constructed by any handy-man at the cost of little more than the price of a few bolts and nuts. Such a crush is not, of course, as efficient as the "squeezer," but on farms, as opposed to ranches, it will allow of handling cattle sufficiently quickly for all practical purposes. It is especially useful when handling in-calf cows or heifers, which it is undesirable to throw, and it saves much time and trouble when dealing with young untrained oxen. With practice, and by using a good hot branding iron, the branding of cattle may be quite satisfactorily done in this crush.

The uprights A should be of good 4 in. native timber, the rails E of 3 in. timber as straight as possible. The light rails B and C (for holding the movable bales D in place) may be of flat sawn timber or of some tough 2 in. native wood. Light iron rails, if procurable, would be preferable to either. The rails E should be bolted to the uprights A. For this purpose 9 in. x ½ in. cup-head bolts and nuts will be found suitable. The light rails B and C may be fastened with nails or screws. The heads of the bolts should be on the inside, and, if possible, should be counter-sunk flush with the timber. The movable bales D may be of strong smooth 3 in. timber, free from knots, etc., and about 5 ft. long.

The two sides, which are exactly alike, should be arranged squarely opposite one another, and the light rails B and C should be adjusted to leave spaces approximately 5 in. square for the reception of the movable bars D. Care in this respect will increase the efficiency of the crush and the speed of working. It will be noticed that there are two sets of light rails B and C at the rear end of the crush. This enables one to shorten the space in the case of smaller animals by putting the movable bale D on the forward set of rails.

The net space between the rails E on the inside of the crush and race should not exceed 2 ft. 3 in. The writer is aware that this will be awkward in the case of very long horned animals, but leaving out of consideration the horns it

is sufficient width for the largest beast, and any greater space permits of too much movement. The length of the race, 18 ft., tends to speed up the work, as cattle will follow on into the crush more willingly if two or three are standing in the race. In practice the race should never be empty while there are still cattle to handle. The movable bales in the centre and at the rear end of the race facilitate working in this way.

In so far as the collecting pen is concerned, the dimensions given are not essential, but they will be found convenient and have been arrived at after repeated practical trials. All gates should be made to swing both ways. The writer has found mopani or other hard wood for the uprights and gum poles for the rails give satisfactory results. If ants are likely to be troublesome, the uprights should be well tarred before placing in the ground, and tar should be freely mixed with the earth when filling up the holes.

Nature Notes.

III. ADAPTATION.

By C. F. M. Swynnerton, F.L.S.

"*Many of the Germans are very contemptuous about making out use of organs; but they may swear their souls out of their bodies, and I for one shall think it the most interesting part of natural history.*"—Charles Darwin.—(Letter.)

It is a day in February, the night's thunderstorm has at last taken its departure, and the sun has dried the grass. There is a sparkle in the air that is not to be resisted, yet a quality of damp warmth that promises an abundance of winged insect life. So we take up our nets, and the quite indispensable note-book, and wander forth.

Insect life in abundance there is, not merely on the wing but scurrying or marching underfoot, resting or feeding on the herbs or foliage, in the flowers—everywhere. Even in the manure pit we passed at starting, its contents now semi-liquid with the rain, the surface was squirming here and there with the movements of the fly-larvæ below; and, if we step warily now to this patch that still remains uninvaded by the wide scattered head of the column of driver-ants that meets us, we may see yet further secrets of the insect underworld revealed. For not merely the crawlers on the earth's surface are now climbing unwonted grasses to escape the ants, but the crickets, the cockroaches and the beetles that live below it and shun the daylight are following them, even to the very ends of the stems and blades. Thence at last, pursued by blind yet unerring foes, they drop to the ground one by one, each to become the struggling centre of a seething mass of black, wiry legs, and to die as full of wounds as a lion that kaffirs have finished. Yet even here you may see escapes—of spiders or caterpillars

that drop indeed, yet hang suspended by their silken threads between the ants above and the ants below until the peril passes on; of ladybirds and blister-beetles, from which the ants recoil; and of hard-armoured people who crawl away from under the mass of their besiegers and gradually brush off against the grass-stems those which have succeeded in obtaining a hold. Few holes or cracks are left unexplored by the marauders, or found untenanted. This one was a bee's nursery, and the ants drag forth the fat white babies; into that one a moth caterpillar crawled to cast his larval skin and lie in privacy till wings should come, and the ants haul out his glossy brown chrysalis. Here they swarm up a furrowed, moss-grown tree-trunk, and an unsuspected wealth of insect and other life is revealed—earwigs and woodlice and beetles and their grubs from under loose bark, a chrysalis from a chink, lichen-coloured moths and a lichen-coloured mantis from the surface. Even when, leaving the "drivers," we at last reach the stream that is our first objective, we shall find insects whirling giddily over its surface or swimming in its depths. The motto of the insect is that of the Royal Artillery —"everywhere"—*ubique*.

But their ubiquity is not their only outstanding feature. There is also a riotous diversity about them that fascinates and puzzles. Here is no mere swarm of locusts covering landscape and sky with a single, shimmering wash of dull-red monochrome, every individual exactly like the next one. One has only to enumerate the seven main insect orders—beetles, grasshoppers, etc., dragon flies and white ants, bees and wasps and ants, moths and butterflies, bugs and frog hoppers, flies—to convey to the hearer the impression of great diversity, of colour, form, food and habits. Nor is it different when we look at the members of a single order. An hour ago, on leaving, we watched, probing quiveringly, on tip-toe, the deep, narrow tubes of the pink periwinkles, four very variously coloured big "swallow-tail" butterflies—brown and yellow chequered (No. 1, Plate I.), black with a blue metallic stripe (No. 2, Plate III.), white with a black-laced tip and margins and crimson wing-bases (No. 3, not figured), and lemon yellow with a black band (No. 4, Plate I.), this last the only one of the four that does possess "tails"; and this lemon yellow gentleman, we happen to know, possesses also

a whole bevy of tail-less female forms, each, in coloration, as unlike her co-wives and her man as it is possible to conceive, yet extraordinarily like some quite unrelated butterfly. Beside them great grey hawk-moths, their fellow-members of the *Lepidoptera*, built not for lightness and a dancing flight like these *Papilios*, but, massively and torpedo-fashion, for steady hovering and lightning rushes, were thrusting their far longer tongues into the far longer tubes of white Datura flowers. Yet not three yards away, below those cannas that were attracting only sunbirds ("honey-suckers"), and the red hot poker clump that brings the bulbuls, were other butterflies, *Acræas* (No. 5, Plate II.), *Nymphalines* (No. 6, Plate II.), skippers (No. 7, Plate I.), that ignored the delights both of periwinkles and of daturas, and revelled instead in the shallower nectar of zinnias and blackjacks; and even these flowers—and the others—were left deserted by various "whites" (No. 8, Plate II.) and a fifth swallow-tail (No. 9, not figured) for the insignificant flowers, with their open discs, of the overhanging mass of *Helinus*. Since then we have passed or been passed by butterflies of every hue and degree of haste: red, brown and orange kinds with black markings (No. 10, Plates I. and III.), big chestnut fellows with a white forewing bar (No. 11, Plate III.), black and white (No. 12, Plates I. and III.), blue and yellow (No. 13, Plate IV.), blue and black butterflies (No. 14, Plate IV.), white butterflies with red, orange and purple forewing tips (No. 15, not figured), and butterflies spotted like guinea fowls (No. 16, Plate III.). Some flew on and on before us in friendly fashion, settling on the ground, others sailed lazily; little dark brown fellows with a beaming eye (No. 17, Plate IV.) danced feebly amongst the grass-stems; great *Charaxes* (No. 18, Plate IV.) of every colour dashed from exuding gum or ripe fruits with the speed and clatter of doves, and a huge bottle-green *Salamis* (No. 19, Plate V.) watched us, head downwards, from the safety of a high-placed leaf. Finally, reaching the stream, we find, spread out before us on the wet sand of the drift, the fitting climax to this feast of diversity in the form of great, solid patches of butterflies—yellow ones here (No. 20, Plate I.), white ones there (No. 8, Plate II.), crimson-based yonder (No. 3, not figured) and little blues here (No. 21, Plate I.)—birds of a feather keeping together, and the better able thereby to transmit an alarm.

It has been much the same with the beetles we have passed: various colours, sizes, forms and temperaments were there, from those of the small brightly metallic longicorn that lives on the flower-heads and smells of turpentine and squeaks, the tiny flea-beetle with its unexpected leap, and the white or yellow spotted black *Carabid* that races away and discharges Parthian shots, to the more phlegmatic people, large and small, who roll balls or are rolled downhill by them, who tuck their legs out of danger when you pick them up, and resign themselves with obvious confidence to their not improbable fate, and the big, round, black varnished *Amiantus* (No. 22, Plate V.) that toddles amiably along the path, indulges in mild butting matches with his male friends, and gets trodden on by passing donkeys. It is the same with the plants. Wherever they can grow, they do grow, even at the bottom of the stream and of the sea it flows into. The very rocks boast their mosses and lichens, and the heavy branch above us is compelled to carry quite an aerial garden of ferns and orchids and hanging cactus, while its own twigs are being stag-horned by the flame-flowered mistletoe that has gripped their bases and diverted their food-supply to itself. As for diversity, compare this little "hyssop" of a four-inch high lobelia with the "cedar" of that 15 feet thick mahogany in the forest patch, or pick leaves from the dozen plants around us and see how varied are their forms and coverings; or the next six kinds of flowers we see, and contrast the structure, colours and smell, and watch, once more, their visitors.

As of butterflies and beetles, so in a greater or less degree of the rest of the animal kingdom. But what does it all mean? What, firstly, has enabled animals and plants thus to seize on every niche, on every possible and impossible dwelling place from the artificially lighted depths of the sea to the lofty branch of a fellow plant or the nostrils of a sheep, on every possible and impossible article of food, from insects and grass and the salts of the rocks and the hardest wood to the blood of live mammals and the feathers of live birds?

The dead fruit-beetle (No. 23, Plate V.) floating past seems to suggest the answer. So do the mosquito-larvæ, lately closely fringing both sides of a floating twig, with every air-tube at the surface, that we felt it our duty to scoop up and

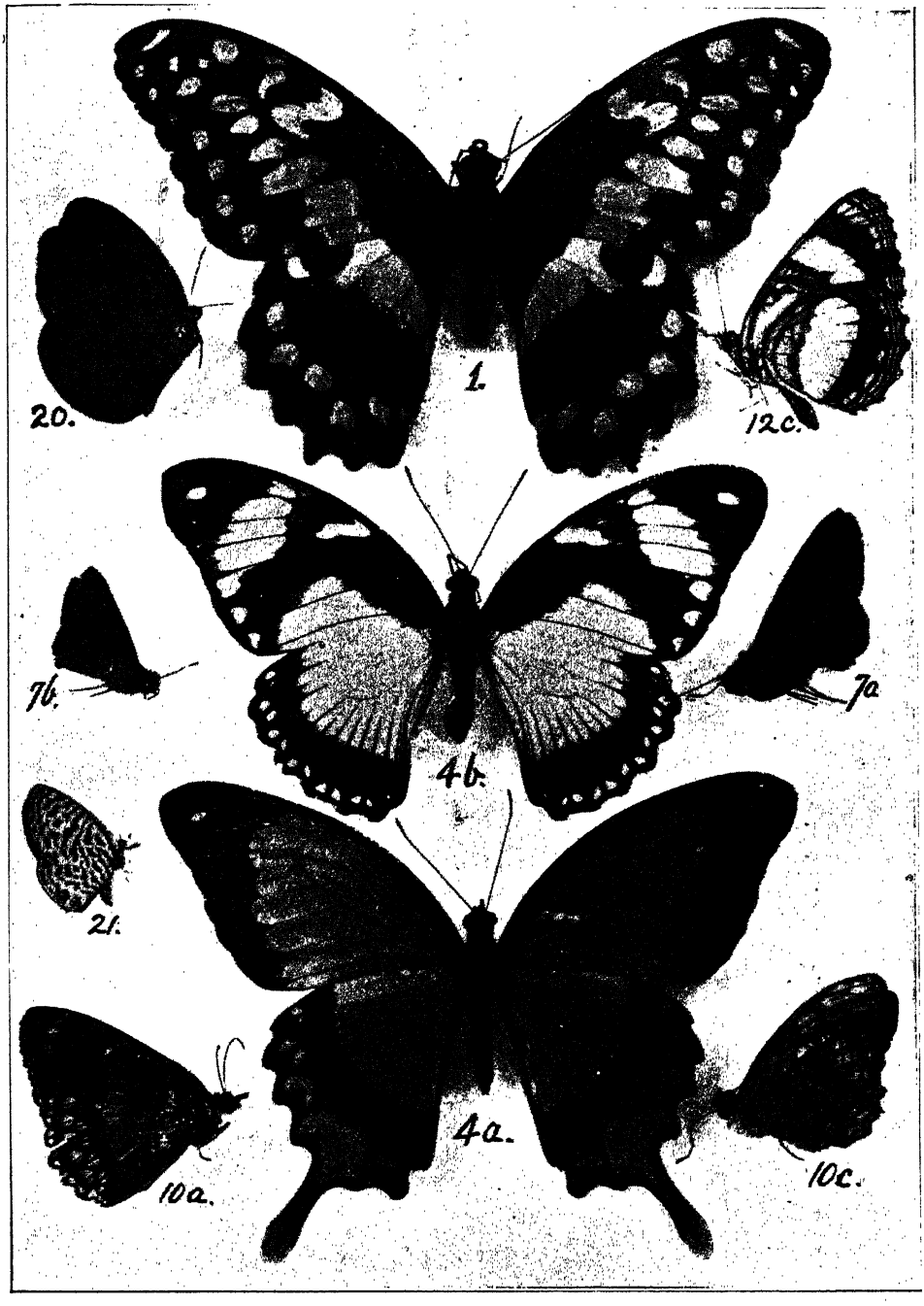


Plate I.

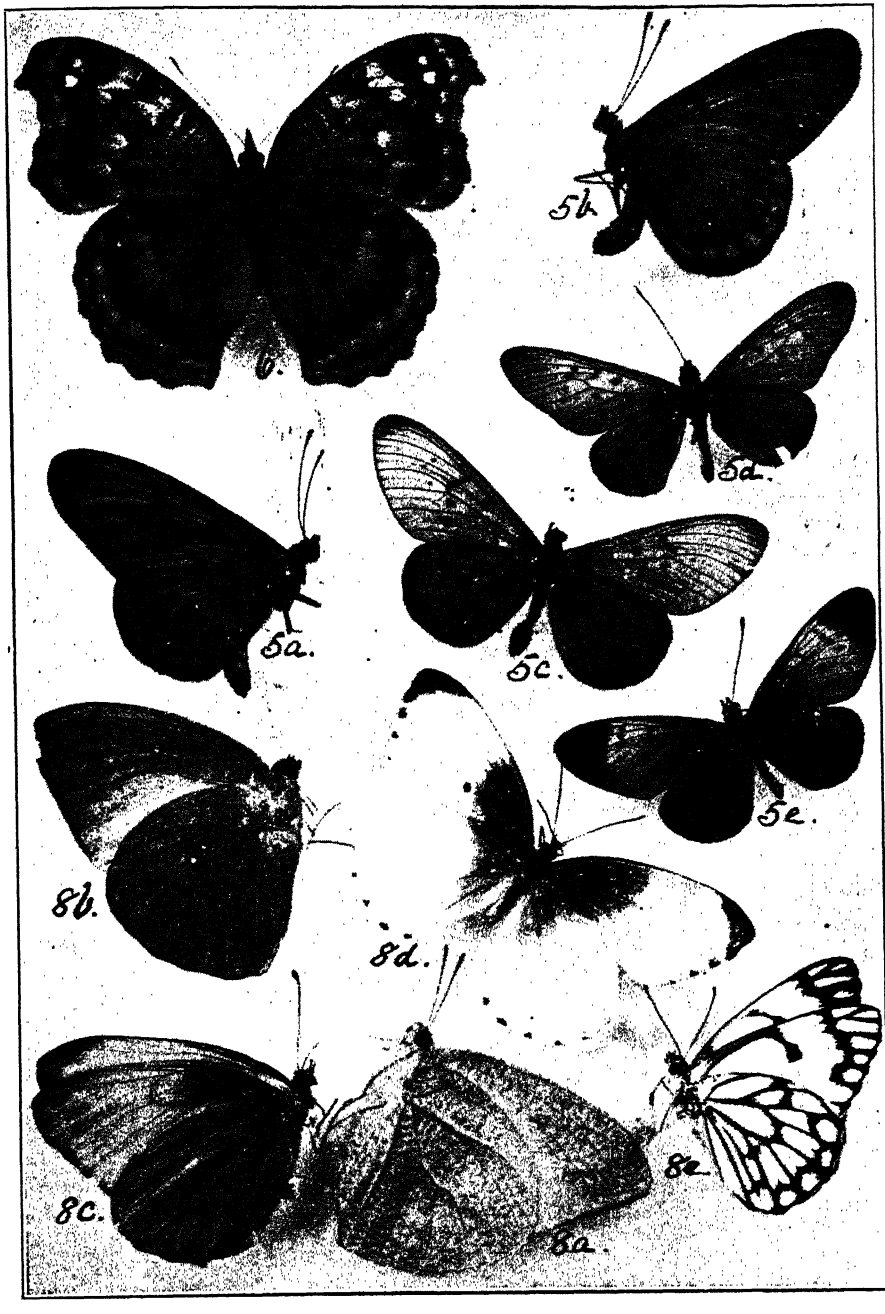


Plate II.

leave on the bank, for they are already dead or dying. The fruit-beetle, unlike the larvæ and some relations of his own, was not adapted to live in the water. The larvæ, unlike the fruit-beetle and unlike their own adults, were not adapted to live on land. Adaptation then, surely, is the reply to our question. And, as for diversity, will adaptation to such diversified surroundings as we see about us not suffice to explain it? See how different are the plants of the river bottom from those of the vlei, of the vlei from those of this schisty rise, and of these fire-swept woods from those of the forest on the hill into which fire never penetrates. Shut out the sunbirds from those flaming mistletoe flowers and let only insects in, and the plant will set no fruit. Admit only sunbirds to the flowers of the supporting tree, *Gardenia tigrina* let us say, and it will set no fruit. Each is adapted, by its flower's shape and mechanism, only to a particular set of pollinating animals. Next take the matter of protection from enemies. The green lowrie that was moving jauntily in the tree's green foliage is capable, as we have seen at other times, of making itself very invisible there if threatened; but the night-jar, a wearer of mottled browns, that rose at our feet an hour ago, sought, in settling again, the uneven brown of bare earth and dead leaves, and though looking straight at it, we lost it, and failed to pick it up again till it rose for the second time from under our feet. So, too, the lichen-coloured moths that the "drivers" flushed were neither on green leaves nor brown ones, but on a lichen-coloured trunk, and of the grasshoppers that people the early "burn" we are now crossing some look extraordinarily like little bits of burnt stubble, while others carry on their backs a picture of a tender grass-blade just shooting, and both are in appearance quite unlike any grasshoppers we have seen to-day under other conditions, though in some cases they seem to belong to the same species.

So far, excellent. But—in this mixed veld you see it well—how about the diversified forms of plants you find growing together under identically the same conditions? These conspicuous, reddish, black-spotted butterflies again: they are as sluggish and indifferent to attack as a winged thing well may be. See the way they loll from their flowers, and contrast it with the erect seat and brisk action of a painted lady. Here, surely in relation to enemies, there is no adapta-

tion. Catch me an *Acræa* (No. 5, Plate II.)—a drop of yellow liquid exudes from its thorax. Smell it. No? Taste it. Ah! Catch me this black and white *Amauris* (No. 12, Plate III.). Smell it. You are surprised at the intensity of its stench. These may not then possess the particular adaptation that protects the night-jar, but they possess another instead which is likely to be quite as effective. And, after all, relatively few animals are protected by any really high degree of concealing coloration. Take our easy-going conspicuous friend the *Amiantus* (No. 22, Plate V.); his adaptation against enemies is his great hardness; that of a big fruit-eating *Charaxes* butterfly (No. 18, Plate IV.) is its speed and strength and struggling power, a wasp's is its sting, a snake's its fangs, a cow's her horns, a boar's his tusks, and a donkey's its heels. In other words, the very same necessity in the very same environmental conditions may be met by different animals or different plants by means of a great number of different adaptations, and the diversity that has astonished us is a matter both of adaptation to diversified conditions and of diversified adaptation to the same conditions.

Human warfare has at all times allowed good illustrations of adaptation. Just lately the offensive adaptation of the gas attack was countered by the defensive adaptation of the gas helmet, and the defensive development of the machine gun by the offensive one of the "tank"; while the unprecedented bombardments of the present war have been met in several ways—by an extraordinary multiplication of the wire entanglements, by a reversion to steel helmets, by temporary evacuation of the ground bombarded and by life in subterranean galleries. Adaptation in nature is mainly concerned with the getting of food, with defence against enemies and climatic and other conditions, and with the safe launching of further generations. It is universally acknowledged to be the great outstanding feature of plants and animals in all their parts and habits and organs, and the study of adaptation—of the diverse means by which each kind of animal and plant has contrived to meet the various necessities and dangers attaching at each stage of its life to the station it has invaded—is, without doubt, as Darwin claimed, "the most interesting part of natural history." I have tried to suggest some few of the problems that may present themselves for solution to a

Rhodesian observer in the course of a walk in summer. Problems of feeding, of pollination, of coloration and of defence against enemies; but for the intelligent investigation of any one of them he will need just to know the answers that have been given to the question—How has adaptation come about?

However they may differ in matters of detail, scientific men to-day are agreed on one main fact, that the adaptations we see are the result of evolution; that the world was once inhabited by organisms far simpler than most of those that inhabit it now, and that our complex modern plants and animals are the direct but vastly modified descendants of this simple form of life.

The most important evidence of evolution comes from the stratified rocks—still being laid down in our lakes and seas. In order to realise its importance, we must remember that the different fossil-bearing rocks, where found together, lie on one another in the same order. From this it follows that we can deduce the order in which the animals and plants that they contain existed on the earth.

Now these rocks shew clearly that of the different kinds of animals and plants contained in them the greater number no longer live on the earth to-day. Conversely, most of the animals and plants that do live to-day are not represented in these rocks, excepting in the most modern of them. They also shew that during the vast period which they represent whole sets of animals and plants of very diverse aspect arose, flourished and passed away. Great slices of the record laid down when the land stood higher are now under water and inaccessible, and much also has been washed and worn away; but those portions of it that are sufficiently continuous shew that the changes in the world's inhabitants, enormous as they have been, have come about so slowly and gradually as fully to support the idea of "descent with modification."

The rocks have supplied other evidence. Missing links have been found between animal groups now more or less widely divergent. Especially striking are the links, often quoted, between the reptiles and the birds, on which (with other evidence) we base the view that birds are descended from reptiles—one such link being a bird with teeth, reptilian

claws in the wing and a lizard-like tail fringed with feathers. The pedigrees of particular kinds of animals have been traced down through the rocks in so complete a manner as to amount almost to a demonstration of the truth of the theory of evolution.

Our modern horse, with its one toe and two splint-bones (rudimentary toes)—an animal adapted for fast running on hard open ground—has been followed down, through several steps, to an animal not larger than a fox, probably adapted for moving on swampy ground, with four toes, of which all three joints probably rested on the ground. The change in structure has probably followed a change in conditions or habits, or more likely both.

Other lines of evidence are afforded by cases of reversion, as where a horse or mule "throws back" to the striping of a zebra-like ancestor; by rudimentary organs, such as the claws, that are all that remains externally of the legs of a python; the front teeth that never cut through the upper jaw of a calf; and the imperfect horns of an occasional reed-buck ewe; and by those cases in which new adaptation has enormously changed an animal's shape or organs, yet has very visibly done so merely by modifying what was there before. Thus a whale, by adaptation, has now the form of a fish, yet it retains the skeleton of a mammal, five fingers, hind-limb traces and all; it has warm blood, it still rises to the surface to breathe (like the less specialised seal and the vastly less specialised hippo.), and it suckles its young. If further confirmation of its ancestry were needed, it has young with mammalian teeth (lost before birth) and fossil ancestors, the earliest known of which possessed, as adults, not merely mammalian teeth, but the same arrangement of them as occurred in the flesh-eating land mammals of that period, suggesting the possibility of a yet earlier ancestor from whom both the whales and the carnivora of to-day may have descended.

Then we have the facts of geological distribution—which, for reasons of space, I will not discuss here—and those produced by embryology; that is, by the study of the early stages of plants, and of the young born and unborn of animals. The study of the fossil-bearing rocks suggested that the further

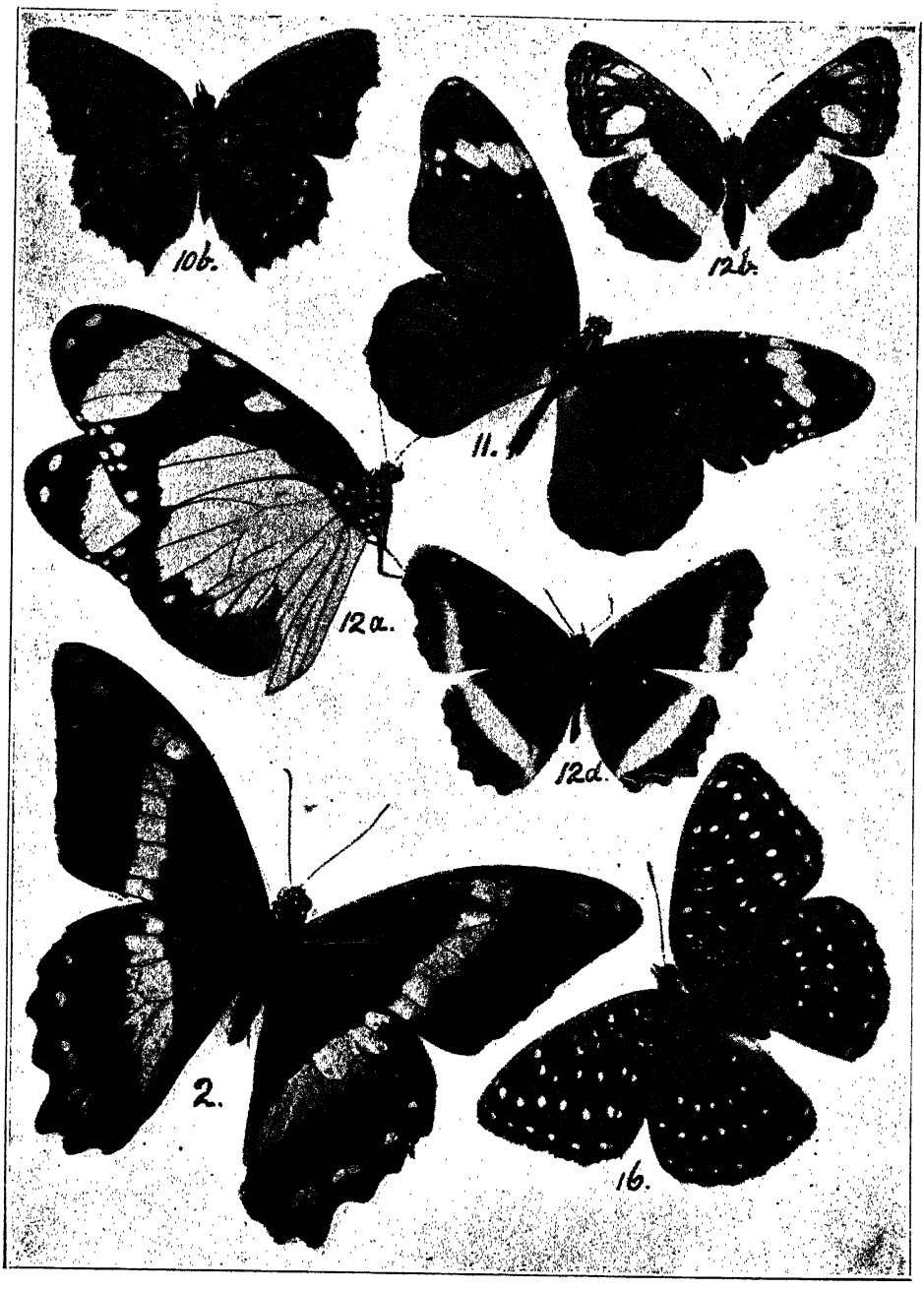


Plate III.

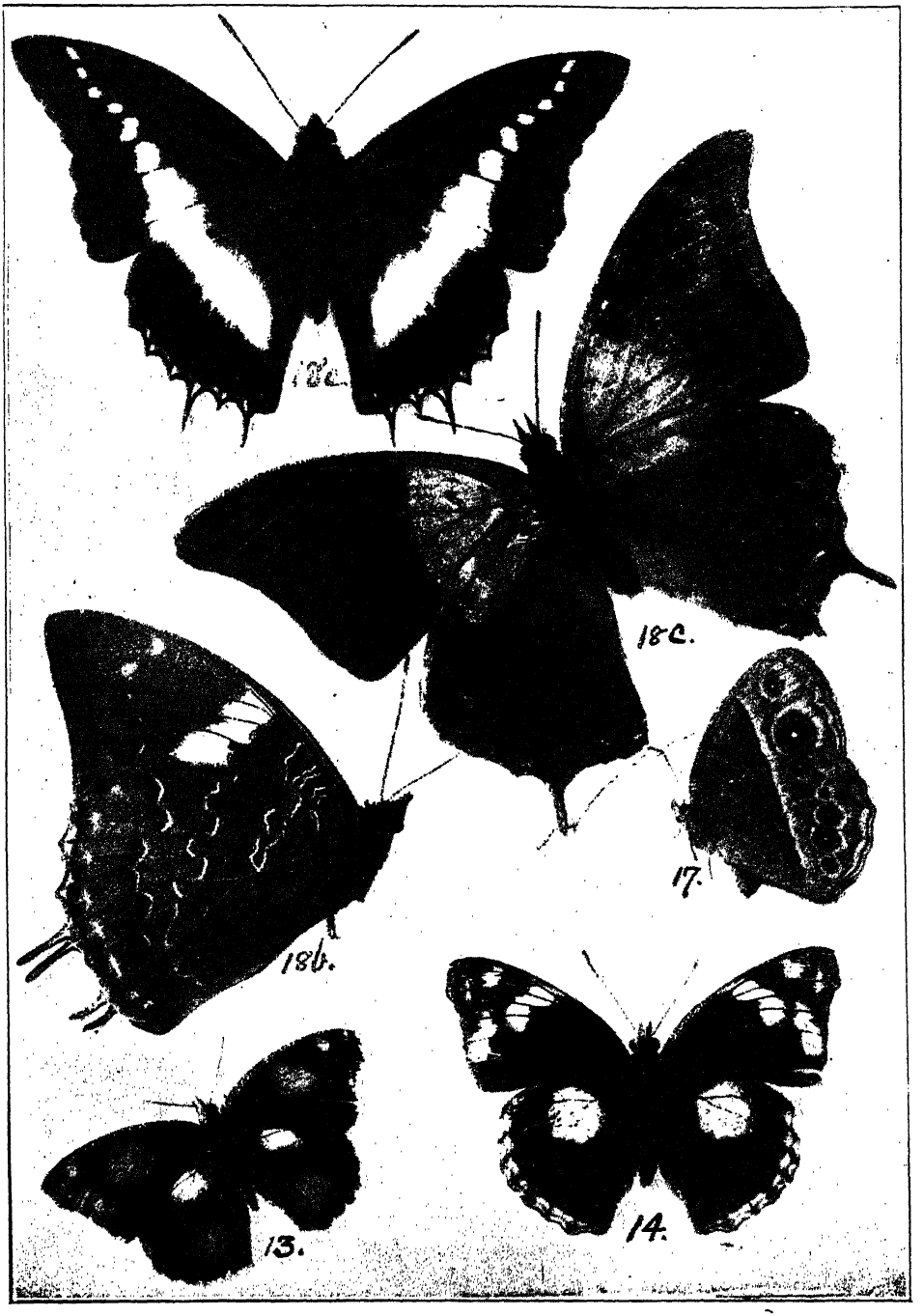


Plate IV.

back we go, the more primitive do forms in general tend to become, and we are tempted by the strong circumstantial evidence afforded by classification—also not discussed here—to believe that if we could see right away back we should find the beginnings of all plant and animal life in something even simpler than the one-celled microscopic "germs" of common parlance that are at the bottom of our series of living things to-day—than *Amœba*, let us say, on the animal side, and, on the plant side, some of the green *Algæ* that are ubiquitous in water and may now be found covering posts, trunks, leaves, etc.—or than those forms, pointing to a common ancestry for the two "kingdoms," of which it is impossible to say whether they should be called plants or animals.

Embryology confirms this view by shewing that an individual animal, for instance, can only attain the full present day development of its kind by itself starting thus at the very bottom, as, practically, *Amœba*, and repeating in the original order the main stages through which classification suggests that its race has passed in the course of its evolution through the ages. Thus all back-boned animals pass through the same early steps, up to a stage in which all of them shew a fish-like arrangement of the veins and possess gills or gill-slits. Here the development of the fishes themselves—nearly all of them—is completed. But reptiles, birds and mammals go well beyond this stage, except in occasional highly abnormal individuals, and are eventually all born not with gills but with lungs, and till the moment comes for the birds and mammals respectively to branch off from the reptiles, all remain extraordinarily alike. The great embryologist Von Baer, as quoted by Darwin, forgot to label two embryos in his collection that were at this stage, and, with all his intimate knowledge of embryos, he was unable later to tell whether they were reptiles, birds or mammals. The frog-class provides connecting links of the greatest interest. The more typical frogs are born at the gill-bearing stage, and remain practically fishes for a considerable portion of their lives. Then they develop lungs and legs, lose their gills and their fish-like tails, and become comparable to the reptiles. Some just take the next step. The black salamander, for example, is born with lungs, the gill-bearing stages being already pushed back into the pre-natal period, as in reptiles, birds, etc. But release the

young prematurely—at the second of their three embryonic stages, which corresponds with that at which the young of the spotted salamander is born—and they take to the water, and breathe with gills as readily as the latter.

Take, again, the thrush family, comprising thrushes, blackbirds, robins, nightingales, chats and other birds. Relatively few are spotted in the adult plumage, but all are in the first plumage, and this indicates the descent of all from a single spotted kind of ancestor. Or, take an instance from plants. Anyone who has planted Australian blackwoods will know that their early leaves are like those of their extremely near relations the wattles. This indicates their descent from a form with an ordinary wattle leaf. Then come intermediate stages, representing a tree with the wattle leaf, but flattened leaf-stalks, and we wind up at last with a tree in which the leaves are only represented by the flattened leaf-stalks—an adaptation, it has been suggested, to heat and drought (Plate VI.).

The "recapitulation-theory," as it is called, has received support from the finding of fossil animals which, as adults, had only reached a stage that is now passed through as a mere phase in development by their modern representatives, and from the fact that even in living animals some thus pass through and beyond what is still the final stage in some of their relatives. Note, for example, the spotting of young lions. It constitutes a strong argument in favour of evolution, but I have devoted space to it here mainly because it gives us an insight into the true nature of our modern adaptations as having been merely superimposed on older ones, as these were on still older ones, and these on others, the machine being endlessly altered and added to as needs and conditions changed. Our modern rifle has evolved from the bow *via* the cross-bow and the flint-lock; but, to build a new rifle, we do not have first to make a bow, then add the stock of a cross-bow, then replace the original bow by a smooth bore barrel, and finally add rifling and breech block and a magazine, and modernise the sighting. Yet this is Nature's method of building up the individual—not but what she takes short cuts.

Charles Darwin's great achievement was the amassing and stating of such convincing evidence on the above and other

lines as at last (after strong initial opposition) to force people to face the fact that evolution *has taken place*. In this Lamarck had failed. In what manner, then, did these two men, the founders of our two great schools of evolutionary thought, conceive that evolution with adaptation had been brought about?

Lamarck laid stress on the effects of use and disuse. He pointed to the actual adaptation that we may see taking place in individuals—the strengthening and enlarging of muscles by exercise, for example, and their dwindling through the lack of it, and claimed that if the habit or the conditions that produced these results were to be continued through very many generations, the adaptation would, if other circumstances favoured, tend to be inherited without a repetition of the stimulus that was originally necessary to produce it. He attributed to disuse the loss by domestic ducks of the power to fly, and to upward-stretching, continued throughout many generations, the great elongation of the neck and fore-limbs of the giraffe. The dwindling of the hind limbs of whales till the thigh bone (where still present) weighs only an ounce, the reduction of the eyes of moles, living in darkness, to mere specks, and the long legs of wading birds are amongst very numerous other instances that have been suggested. "In plants," he wrote, "where there are no actions, and consequently no habits, properly so-called, great changes in the environment have nevertheless led to great differences in the development of their parts. . . . All botanists know that the plants which they transport from their native place in order to cultivate them in gardens undergo, little by little, changes which, in the end, make them unrecognisable." (Prof. Dendy's translation: "Outlines of Evolutionary Biology.")

Charles Darwin's view was the result of 22 years of the laborious collection of evidence, and was at last read in 1857 before the Linnean Society in the form of a paper. With it was read and published an essay to the same effect by Alfred Russell Wallace.

Darwin laid stress on the great changes we are able to produce in our domestic plants and animals by means of artificial selection—by breeding only from individuals with

characters that we desire and eliminating the others. He believed that something of the same kind takes place in nature.

In his own words: "As many more individuals of each species are born than can possibly survive, and as consequently there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself . . . will have a better chance of surviving, and thus be naturally selected."

What Darwin called "natural selection" Herbert Spencer christened "the survival of the fittest." For the word "fittest" we might substitute "best adapted." Seeing that the young of animals and plants tend to have the qualities of their parents, the fact that, on the whole, it is the best adapted individuals of each generation who will live to leave offspring will result in an ever continued adaptation to gradually changing surroundings and necessities. Here we have an explanation for both evolution and adaptation.

"Selective factors," as the agencies of selection are called, are of very many kinds. Hunger will weaken or directly destroy those individuals which are unable to cope with defensive developments in their prey, and those of the prey that are insufficiently up-to-date in their defences will likewise tend to be destroyed by enemies, before they have had time to leave offspring. Here we are reminded again of our own race in armaments. A limited food supply again will cause a "struggle for existence" as between the members of the same species—or different species with the same feeding habits—and here it is the "rustlers" who will mostly survive and leave offspring—also those individuals that are able to change their habits and migrate, it may be, or take to new foods. Here we at once see how it is that plants and animals have, as we said before, managed gradually to "seize on every possible and impossible niche" on the earth's surface. The form of competition here referred to will be severe even amongst animals, which can more easily change their habits, but it is most readily witnessed in plants, which so visibly drop their seeds in such vastly greater numbers than can possibly survive the competition amongst themselves for space and food. Study the veld! Special matrimonial advantages, again, will tell; and

many a characteristic might be suggested which would conduce to the successful launching of the next generation.

It must be remembered that while mostly the "fittest" survive and children tend to be like their parents, there is always an immense amount of variation present to afford a basis for continued selection. It would be difficult to find two individuals of a species that are exactly alike.

Lamarck's view, summarised (rather unfairly!):—

"A deer with a neck that was longer by half
Than the rest of its family's—(try not to laugh),
By stretching and stretching, became a giraffe,
Which nobody can deny!"

(Lord Neave, 1861.)

Darwin's:—

"Ere man was developed, our brother,
We swam and we ducked and we dived,
And we dined as a rule on each other—
What matter, the toughest survived."

(Miss Kendall, Ballad of the Ichthyosaurus, 1887.)

Note.—I re-quote both verses from Prof. Poulton's "Essays on Evolution." The first was intended by the author as a hit at Darwinism, but hit the wrong mark. True, "the neck that was longer by half" is a Darwinian touch, but the rest is pure Lamarck. The opening and concluding quotations of this article are re-quoted from Prof. Poulton's "Darwin and the Origin."

Present Position.—Darwin recognised limitations to the natural selection and accepted Lamarck's explanation—inherited effects of use and disuse—for such cases as the increased weight of the leg-bones of the domestic duck and the dwindling of its wings.

Since then a discussion has been on foot between the Neo-Darwinians, who, following not Darwin in this matter at all, but Wallace and Weissmann, deny all validity to Lamarck's factors, and the Neo-Lamarckians—with Herbert Spencer as an early champion—who mostly, I believe, acknowledging natural selection as a valid factor, laid great stress on the inheritance of modification acquired in the individual's lifetime. Weissmann demolished with some success the cases on which they depended, but a number of very interesting experiments have been carried out by Tower, Fischer, Standfuss and

others in which modifications—not necessarily adaptive—produced by the application of special external conditions, have re-appeared in the next generation without a repetition of the original stimulus. The dispute has really narrowed down to the question of their exact interpretation.*

Another discussion has been as to the exact nature of the variations which are natural selection's material. Darwin was inclined to rely most on the ordinary individual differences we see, for example, between ourselves; the mutationists are impressed by the sudden and apparently highly inheritable variations that are commonly called sports. The experiments I have referred to seem rather to bear on the question of the nature of both, and provisionally at any rate the view seems not entirely unreasonable that variation generally within a species of animal or plant is a matter of the re-action of individuals variously constituted by their heredity to a similar, a varying or a changed environment.

Environment (food, temperature, conditions of life generally) being capable, as the above experiments suggest, of producing inheritable modification, it follows that some sort of evolution would have taken place even if natural selection had not existed—had the lion lain down with the lamb, and the world been big enough, and transport provided, to prevent over-crowding. But to me, at any rate, it also seems that without the narrowing-down influence of this great exterminator of promiscuous variation, it would have been a far more profuse and disorderly evolution than it has been. It is probably correct to regard environment as the promoter and selection as the director of evolution. The producers of adaptation will have been natural selection, and, if they should prove to be inheritable, the effects of use and disuse.

*In this paragraph and the next are indicated two of the most important problems in natural science that still require elucidation to-day. To Father O'Neil's suggestion in the February number of this *Journal* with regard to the breeding of Emperor moths I would like, if I may, to add the suggestion that as soon as one of our young naturalists has made himself fairly expert at the breeding of butterflies and moths he should make an attempt to produce modification by the application, let us say, of a specially high temperature during portions of the larval and pupal stages, then breed again from the modified insects. The extra trouble and attention, if he could give them, would with luck be more than compensated by the fact that the interest and value of his experiments would be increased a thousand-fold.

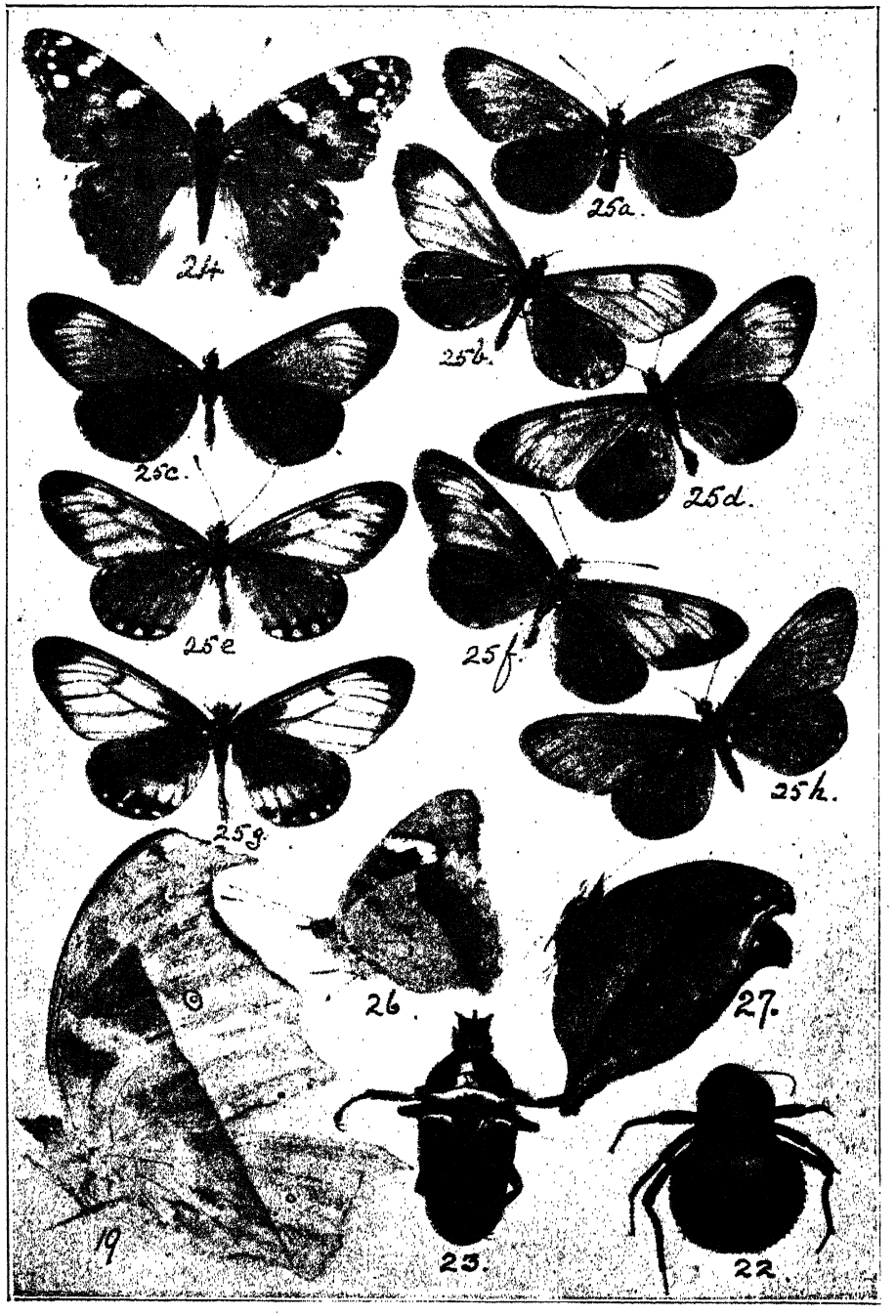


Plate V.

Having now roughly sketched the problems with which one side at any rate of nature study is ultimately concerned, I will conclude with some cases of adaptation that can be studied locally—a few only, as I may give more in a future article.

(1) We find in seeds every kind of device for obtaining their dispersal far and wide, away from the ground that their parents are exhausting of the particular constituents needed by the species. One of their commoner methods is to get hooked on to an animal and so carried away, and there are several ways of doing this. I will here take only the black-jack seed (*Bidens pilosa*), so abundant in our cultivated lands and so annoying in its habit of converting us into involuntary hedgehogs. Look closely at the prongs with which it ends, and you will find that they are barbed all along quite formidably, like the spear of a South Sea Islander, with sharp, long, backward-pointing spines. Their sticking power, under these circumstances, is not to be wondered at nor is their success in obtaining dispersal.

(2) An aid to flight and protection against rain. Take a feather, a big one for choice. From each side of the thick shaft grow great numbers of long, narrow, miniature feathers, the "barbs" packed closely side by side. Rub your finger along the underside of the feather "the wrong way" and you will find that the barbs hold together. How? Hold the feather against the light, or in bright sunlight against a dark background, and slowly pull two barbs apart. As you do so, you will see that the barbules, as the little barbs of the barbs are called, obviously overlap and catch, and having pulled them apart, you are able, if you wish, to hook them together again. And this really is the actual explanation. The barbules point forward, just as the barbs do on the main feather, and this and the big overlap result in each one of them lying across several of the opposite ones. The upper barbules, those that lie on top, have each a number of little, downward projecting hooks, and these catch into the upper, curled-over edges of the lower barbules that they cross. Thus the whole of each side of each feather is held closely together as a single web. Its relative air-tightness enables a bird to support itself in the air, and it is also more or less water-tight.

(3) So-called "mimicry" in cuckoos' eggs. I include

this instance, as it will enable anyone who knows of a few nests, and cares to carry out a simple experiment, to catch a glimpse of natural selection at work. Most cuckoos, as is well known, and some other birds, place their egg after laying it in the nest of some other bird, in substitution for one of the bird's own eggs, and leave the care of the resulting chick to the foster parents. You may sometimes find a cuckoo's egg that does not in the least resemble the eggs with which it lies, but it is a general rule that cuckoos' eggs tend to resemble very closely the eggs of at any rate some of the birds they are most frequently foisted on. This comes out most convincingly in the cuckoos that lay only one type of egg.

The correct answer was suggested some time ago, and I lately in Rhodesia carried out experiments to test it. I placed, in two successive seasons, eggs not their own in the nests of various birds, and I found that while some birds would accept anything, most birds threw out the eggs that were very unlike their own, and some birds discriminated very closely indeed. These birds, obviously, are bringing about the resemblance between cuckoos' eggs and their own by destroying the eggs (and with the eggs the stock that lays them) that are unlike their own. The other less discriminating birds are the ones in whose nests we find the ill-matched eggs.

This last instance of the matching of the victims' eggs by the cuckoos leads us straight to a one-word definition of adaptation, namely, *harmony*; and I end on this note with a passage from our great South African traveller-naturalist, W. J. Burchell, written in 1822:—"It must not be supposed," he says ("Travels in the Interior of Southern Africa," I., 505), "that these charms (the pleasures of Nature) are produced by the mere discovery of new objects: it is the harmony with which they have been adapted by the Creator to each other, and to the situations in which they are found, which delights the observer in countries where Art has not yet introduced her discords."

EXPLANATION OF PLATES.

The plates shew some of the butterflies, etc., referred to in the article, and illustrate also diversity of appearance and of



Plate VI.

adaptation. The former is useful for recognition by members of the same species and for differentiation, by enemies, of species they are *not* hungry enough for at the moment from those that they *are* hungry enough for, this second factor being the dominating one in relation to insects and plants. Diversity of adaptation is illustrated by Fig. 12a and Fig. 5 (nauseousness); Fig. 4b ("mimicry"—escape by resemblance to a nauseous species); Fig. 18 (strength and fighting-weight—note the great thorax of each, filled with muscle); Fig. 19 (brittle wings, shewing evidence of an escape by breakage); Fig. 7 (agility); Fig. 22 (great hardness); Fig. 23 (toughness, a frightening sudden "buzz," and tenacious claws that seize the bird's lores and sometimes cause rejection); Figs. 26 and 27 (concealing coloration); Fig. 26 (representing resemblance to general surroundings); and Fig. 27 (resemblance to a dead leaf).

The following numbers correspond with the numbers in the text:—

No. 1. Papilio demodocus.
,, 2. Papilio lyæus.
,, 3. Papilio pylades angolanus (not figured).
,, 4a. Papilio dardanus, male.
,, 4b. Papilio dardanus, female form hippocoon, resembling the unrelated nauseous butterfly of Fig. 12a.
,, 5. Acræas (Acræinæ). 5a is A. natalica, male; 5b A. natalica, female (note difference in colour of abdomen, a usual difference between the sexes in the genus Acræa); 5c A. neobule; 5d A. oncæa, male; 5e A. caldarena, female.
,, 6. Precis sesamus, dry season form; a common Nymphaline. Its wet season form (natalensis) is bright salmon-red with black markings. Other Nymphalines in these plates are the three butterflies under No. 10, also Nos. 13, 14, 16, 18, 19 and 24; and b, c, d of 12.
,, 7. Two Skippers; a, Rhopalocampta libeon; b, Padraona zeno.
,, 8. "Whites" or Pierinæ. 8a is Catopsilia florella, abundant, males white, females white or (8b) yellow; 8c is Mylothris agathina, female; 8d

M. ruppelli; 8e Belenois mesentina (B. swirina and B. gidica are also very like this).

No. 9. Papilio leonidas (not figured).

,, 10. Red, brown and orange butterflies with black markings; a is Hypanis goetzius; b Catacroptera cloantha; c Atella phalantha. Add the Acræas of Fig. 5.

,, 11. Danaida chrysippus.

,, 12. Black and white butterflies; a Amauris dominicanus; b Neptis saclava; c N. agatha; d Eurytela hiarbas.

,, 13. Precis cebrene.

,, 14. Precis clelia.

,, 15. Teracoli ("Orange-tips," "Scarlet-tips," "Purple-tips"). These are not figured.

,, 16. Hamanumida dœdalus.

,, 17. Satyrines. That figured is Mycalesis safitza.

,, 18. a Charaxes brutus; b C. cithæron, female; c C. candiope.

,, 19. Salamis anacardii.

,, 20. Terias. T. senegalensis is figured.

,, 21. Lycænidæ. Tarucus plinius is figured.

,, 22. Amiantus, probably globulipennis.

,, 23. Neptunides polychrous.

,, 24. "Painted Lady," Pyrameis cardui.

,, 25. a to h, females of Acræa terpsichore, to illustrate variation.

,, 26. Precis clelia (underside).

,, 27. Precis tugela (underside).

Plate VI. Foliage of blackwood, *Acacia melanoxylon*, intermediate stage shewing phyllode (stalk shaped like a simple leaf) carrying a pinnate leaf at the end. In the early stage only true pinnate leaves are present, and in the last stage phyllodes (false leaves).

Rhodesia Maize Fertiliser.

By A. G. Holborow, F.I.C.,
Assistant Government Agricultural Chemist.

The object of the present article is to warn prospective buyers from expending money in fertilisers which, when applied to maize and other crops, give results wholly disproportional to the high price of the article.

It does not need corroborative proof here that, for fertiliser to act quickly and give profitable returns for the first year of application, the separate plant-food ingredients—phosphate, potash and nitrogen compounds—should be present in an available form. The young maize plant requires an adequate supply of food material, especially during its very early life, in order that its constitution may be built up from its earliest days. To suffer starvation at this critical period is attended with poor returns of grain. If, on the other hand, the plant can absorb its full complement of nourishment, its growth is robust, and later it is able to overcome possible adverse climatic conditions and, *ceteris paribus*, produce grain when the partially starved plant would succumb.

The terms "available form" and "water-soluble condition" referred to essentially qualify a fertiliser as readily able to give up its plant foods to the hungry plant. What more available conditions of phosphates can there be than those which are soluble in water? If present in the *water-soluble* condition, the several ingredients of a manure become dissolved by the rains, and the roots are able to absorb the selected plant foods without difficulty. It behoves maize growers to assure themselves, when buying artificials, that the phosphate, potash and nitrogen contents are readily available to plant life. To be even more explicit, farmers are exhorted to

endeavour to have the phosphates of their fertilisers present in the water-soluble state. This is always clearly defined in the guaranteed composition.*

It should be explained that the phosphates of *untreated* bones can be viewed as not being available to the plant until after a matter of years, when the bone particles become slowly decomposed and change their chemical condition in the earth. If good results are desired the first year of application, it is well to consider this point and avoid purchasing manures containing phosphates that will lie more or less dormant in the soil. The fertiliser which bears the special name which heads this article is known by this Department as one containing in an acre dressing—

	lbs.
Water-soluble phosphoric oxide	27.00
Nitrogen	5.25
Potash (K_2O)	12.50

The application to maize on red soil of these amounts per acre has been found to be attended with the most profitable results. Experiments conducted over the past five years at the Government experiment farm, Gwebi, have shewn that, after paying off the cost of the fertiliser dressing, a net profit of approximately £2 10s. per acre can be expected, due to the increase in the yield of maize.

*In the case of basic phosphates the available phosphoric oxide is known as "citrate soluble."

Merino Sheep

AT THE GOVERNMENT EXPERIMENT FARM, GWEBI.

By R. C. Simmons.

The flock of sheep now at the Gwebi farm originated in a number of non-pedigree Merino ewes and a ram introduced into Rhodesia by the late Mr. J. R. Cameron, of Gwelo. In March, 1911, the flock, numbering 26 ewes and 2 rams, was purchased by the Department of Agriculture and placed on the Gwebi farm, where they have been ever since. A ram from the flock of Mr. Lennox McKay, of Bedford, C.P., was used during the season 1911-12. In September, 1912, 15 ewes (one of which died on arrival) and a ram were purchased from Mr. Lennox McKay. These, like the ram purchased in 1911, were of Tasmanian, robust-woolled, smooth-bodied type. In August, 1913, owing to the death of the 1911 ram, another ram was purchased from the flock of Mr. Dan Hockley, of Commandofontein, Port Adelaide, C.P., and was used until August, 1915, when he was replaced by another from the same flock. In the latter part of 1916 a flock of Merino-Persian sheep, which had been running on the Longila farm at Lochard, was brought to the Gwebi and added to the pure Merino flock. It consisted of 65 ewes, 43 wethers, 45 lambs and 2 rams; making the total flock 270.

Up to August, 1916, the flock had been run with the object more particularly of testing the suitability under our conditions of Merinos for wool purposes, and selection had been made chiefly on those lines, although an endeavour was made to keep a large frame as well. Wool of very fair quality was produced. An average of 6 lbs. per ewe was realised, and, notwithstanding the fact that it has never been possible to

market the small clip in proper order, but that it was unsorted and unskirted, it has usually fetched 8d. per lb. at the coast in normal times, and 1s. ½d. per lb. in war times.

In spite of the fact that the Gwebi farm is distinctly unsuitable for Merino sheep, the fact of the flock always having been a small one made it possible to keep them in good health. The only real trouble experienced was blue-tongue in 1913, from which the best stud ram and a number of ewes were lost. Thereafter the flock has been inoculated each year, and the disease has not re-appeared.

On farms such as the Gwebi, which contains long rank pasture and much bush, and part of which is low-lying river land, sheep should always be given the shortest, sweetest, most open and highest-lying veld. With a small flock this was possible, and where grass seeds were likely to be troublesome, an area was mown down for them. With increased numbers it became necessary to use veld nearer the river, and generally to let the flock wander further afield. The result has been that wire-worm and fluke have made their appearance. A further trouble with the larger flock is the increased work in keeping down ticks, especially the boat variety, and attending to cases of lameness caused thereby. The experience thus gained confirms the view that, while the Government experiment farm at Gwebi and similar farms are unsuited for running large flocks of woolled sheep in the way that sheep farming is understood in the Free State, for instance, the keeping of a small flock to provide the farm with meat and for the occasional sale of both mutton and wool is not only consistent with mixed farming, but is to be recommended where arable farming is being followed.

The necessity for kraaling at night and shedding in wet weather, the need for some supplementary food for ewes and lambs in winter (owing to the coarse nature of the winter pasture) and the small portion of the farms that are both high-lying and free from bush, clearly indicate that if sheep are to be kept at all they must be of a type that will pay for closer attention and supplementary feed, and must be in comparatively small flocks.

It is probable that a small flock of mutton sheep could

be kept in first-class condition, and the wethers quickly fattened at a very cheap rate, owing to the large amount of suitable bye produce in connection with maize and crops grown in rotation therewith. The so-called mutton types of sheep in the British Isles are noted for their carcases and for their ability rapidly to convert this food into mutton of good quality. Many mutton breeds produce a very saleable wool, but in practice the wool is a secondary consideration, and the breeders' and farmers' attention is devoted to mutton production, just as the ranchers' sole object is beef and not milk.

Previous to August, 1916, owing to the want of facilities for keeping the ewes and rams separate, the rams ran with the ewes all the year round. This practice is to be deprecated, especially when the feeding of a mutton sheep is contemplated, as it is obviously advantageous to shorten the lambing season, and to have the lambs born at a time of the year when they and their dams can best profit by the artificial foods so abundantly produced on arable farms. With this object, therefore, the rams were taken out of the flock in August. A hundred of the best ewes were selected (in order to reduce the flock to more suitable dimensions) and the rams re-introduced during December and January only, with a view to making the lambing season April and May. It is then proposed to supplement the feed of the ewes, and eventually that of the lambs as well, in order to turn out fat lambs by the following Christmas and avoid any sheep other than the breeding flock being on the farm for a lengthy period. A small flock of sheep thus farmed may be made a profitable item in the farm economy, and there seems no reason why some modified form of the folding system, as practised on arable farms in the Old Country, should not be adopted. With care and attention sheep may be made to thrive, and one may reasonably expect the fat sheep sold or consumed on the farm to form a not unimportant item of revenue, whilst the wool and the manure produced are important considerations to place against the expenses of care and herding.

Rose Culture.

By N. L. Kaye Eddie.

Many requests have been made by subscribers for an article to assist those who desire to beautify their homesteads with the Queen of Flowers, and I am pleased to place what information I have acquired at their disposal. No garden is complete without a rose, and to the housewife a home is empty without a flower.

It is the common opinion of the majority of people, even rose fanciers, that you must purchase your roses or have grafted (budded) stocks to be able to produce good blooms, and, owing to cost and pests, they give up growing them. This is entirely incorrect. Many roses produce the finest blooms on their own stocks. Many give equal results, both grafted or otherwise, but there are some shy bloomers and slow growers which must be encouraged by other roots than their own. At the same time, it must be remembered that climatic conditions and the nature of the soil will affect either result. Henderson, New York, the great florist, forces his blooms for sale entirely on their own roots, and obtains in winter a price of 50 dollars per 100 buds wholesale. These blooms must be very fine to sell at 2s. each.

The best time for taking cuttings is from May to July, according to the condition of the plant. Cuttings may be planted in the open ground. These should be 6 to 9 inches in length, cut above and below an eye with a sharp knife, not secateurs; cut a trench to receive the cuttings, and leave two eyes above the ground, one of which should be just above or level with the earth. The cuttings may be placed about 2 to 3 inches apart. When the row is complete, the earth should be filled in and packed tight gradually from bottom to top, using a small mallet or piece of board. Tight packing of the earth

round the cutting is essential for root production. They should be watered regularly, and be ready for transplanting in January or February.

Sand is the best medium for striking cuttings in tins or boxes, which should be well drained. Cuttings may be planted any time of the year, though May and June are the best months. During other months, wood should be chosen with good eyes at the bottom end of an aged flower stem. Cuttings in tins should be about 4 inches long, and have one eye above the sand, and be placed in a warm spot, and kept well watered. Should it be desirable to force them, place the tins in a protected cold frame, and they will be rooted and ready to transplant in July or August into separate tins or boxes; these should be filled with good rich soil. The plants will then be ready for planting into their desired positions in the open with our early rains. When soil is used for striking, the results will not be so early.

Propagation of varieties by budding is generally practised by nurserymen, as they can produce greater quantities of plants with the material they have on hand. The root stocks used are Briar, Manetti and Dog Rose, but any vigorous plants may be used, such as W. A. Richardson, Archimedes, Beauty of Glazenwood, and even Maman Cochet. Budding may be done at any time of the year, but is best done when the sap is rising. This can be judged by the appearance of the stock. The advantage of budding means the greater chance of success; where only sufficient for one cutting can be procured, perhaps four or more buds may be placed.

Grafting is not as a rule practised, as budding has taken its place. The writer has found it advantageous to replace poor blooms by good ones, by cutting down stocks such as Archimedes and W. A. Richardson, with stems 2 inches thick, and by putting in two to four grafts, and these have bloomed within four months.

There are two planting seasons, one from June to September, and the other during January and February. Roses thrive in almost any soil, and are deep rooters. They should be planted in square holes 2 feet deep and square; these allow the roots to get away, whereas round holes are inclined to

bunch them. Where manure can be used with safety, plenty of well-rotted manure should be mixed with the earth when planting.

Where white ants are very troublesome, roses may be grown in tins with excellent results. Year-old plants may be placed in paraffin tins filled with good garden or turf soil, with cow manure in the proportion of 3 to 1. The result in pot growing will astonish many. These should be pruned and re-potted once a year, and if necessary the roots should also be pruned.

Pruning should be done from May to July, according to the condition of the plants and season.

It is difficult to give advice on situation for planting or varieties, but, if you are aware of the class of the roses you are planting, some guide may be given:—Hybrids are always the smaller roses, and require less root room. They are also generally pruned down very low, therefore they can be planted about 3 feet apart, and placed in front of the Tea varieties; the latter require about 6 feet between each, as they are vigorous growers, and do with very little pruning. Pillar roses and climbers may be placed at the back along a fence, wall, or on specially prepared arches.

It is very hard to advise any special variety of hybrids, as they do not do so well as Teas in Rhodesia; the long dry spell seems to harden the wood and eyes. Teas nearly all do well, and many bloom most of the year, and will thoroughly repay one for the trouble of raising or growing them. Many climbers and pillar roses do exceedingly well.

I append a list of roses which have been tried and found successful, placed in the order in which they have done best with myself:—

Hybrid Teas and Perpetuals—

Hugh Dixon.
K. A. Victoria.
La France.
Frau Karl Druschki.
Emperor of Morocco.
Black Prince.

Konigen Carola.
Gruss aus Teplitz.
Dean Hole.
Etoile de France.

Teas—

Maman Cochet.
Maman Cochet (white).
Archimedes.
Saprano.
Madame Lambard.
Madame A. Chatenay.
Madame Jules Gravereaux.
Souvenir de W. Robinson.
Devoniensis.
Dulce Bella.
W. R. Smith.
Miss Eva.
Papa Gontier.

Climbers and Pillar Roses—

Marechal Niel.
Crimson Rambler.
C. White Maman Cochet.
Beauty of Glazenwood.
Ards Rover.
C. Frau Karl Druschki.
C. Devoniensis.
Reine Marie Henriette.
Hugh Dixon.
Baukshiar.
Dorothy Perkins.

In conclusion, I would remark that all rose growers can help themselves and others by interchange of cuttings, plants, etc., with which they have been successful, and I should like to be informed of any variety which has been doing particularly well with any grower.

Directory of Farmers in Southern Rhodesia.

The following list of names of farmers, with their farms and postal addresses, by districts, is published for general information.

It is requested that any inaccuracies, omissions and changes which occur may be brought to the notice of the Director of Agriculture for corrections in future issues.

Note.—This list includes the names of stock owners who are not farmers in the strict sense, such as companies and residents in townships who keep cattle.

WANKIE.

P. F. M. Briers, Mazala, Intundela Sdg., P.O. Dett.
J. A. Chalmers, Lynwoods Estate, Gwaai.
P. D. Crewe, Nantwich and Extension and Prestwich, Wankie.
J. A. Cumming, Mazabeni, P.B. Matetsi, Bulawayo.
E. H. Cumming, Sisuna, Sterkfontein, P.B. Matetsi, Bulawayo.
H. B. Cumming, Pandamatenga, P.B. Matetsi, Bulawayo.
W. B. Cumming, Guyo and Mtentwa, P.B. Matetsi, Bulawayo.
A. T. Cumming, Tsabolisa, Tshowe and Upper Tshowe, P.B. Matetsi, Bulawayo.
A. G. Diekert, Good Luck, Malindi.
A. Giese, Deka, Little Deka and Mbala, P.O. Wankie.
F. H. Going, Balcarras, Limenda, P.O. Malindi.
J. James, Masekari, Victoria Falls.
T. C. Kearney, Mahohoma, near Wankie.
J. F. Kennedy, Sikumi, Malindi.
F. Mansfield, Bindon Vale, Malindi.
R. Meares, Sikombela and Kumbeiro, P.O. Que Que.
S. Potgieter, Vlakfontein, P.B. Guyo, Matetsi, Bulawayo.
H. G. Robins, Little Toms and Big Toms, Toms Farms, Wankie.
T. C. L. Thomas, Bombusi, Wankie.
J. S. van Rooyen, Ferndale, Gwaai.
J. van Zutphen, Dulci, P.B. Matetsi.
P. H. Viljoen, Shankaruka, c/o W. B. Cumming, Matetsi, Bulawayo.
Wankie Colliery Company, Wankie Colliery Farm, Wankie.
E. R. West, Westwood, Hasibi, Victoria Falls.

NYAMANDHLOVU.

T. Bain, Redbank "B," c/o S. F. Townsend, Bulawayo.
Beamish Bros., Hilda's Kraal and Esperanza, Nyamandhlovu.

— Betts, Richardson, Nyamandhlovu.
E. P. Blignaut, Dhlula, P.O. Nyamandhlovu.
L. Blume, Inkuku, P.B. Redbank.
M. Bradfield, Silverstream, Nyamandhlovu.
W. Bremner, Serui, Nyamandhlovu.
Clark & Taylor, Naseby North and South and Stanhope South, P.O. Box 40, Bulawayo.
Crighton & Bowe, Moonto, Nyamandhlovu.
R. J. Dallas, Dunolly, P.O. Bulawayo.
Dechow & Tweedale, Highlands Estate, Dilkosch and Epping Forest, Fountain, Matabeleland Concession and Langvlakte, P.O. Box 171, Bulawayo.
J. J. de Clerk, Samunga, Sloane's Pte. Bag, Redbank.
Geo. Graham, Claverhouse, P.B. Morgan's Spur.
J. B. Gray, Billars and Bells and Khami, P.O. Box 426, Bulawayo.
L. & C. Green, Enyamandhlovu, Nyamandhlovu.
Gwynne's Rhodesia Estates, Edwaleni, Nyamandhlovu.
Mrs. J. C. Jackson, Condene, Wankie.
C. S. Jobling, Umguzana Block and Devonby and Helenvale, P.O. Box 242, Bulawayo.
E. Jowett, West Junction, Nyamandhlovu.
J. J. Little, M'nondu and Blew Bonny, c/o Smart & Copley, Bulawayo.
J. P. McCay, Paddy's Valley, Jumpers Mine, Queen's.
J. K. McDonald, Blackwreath and Riverside, Fort Usher.
G. Mitchell, Spring Grange and Geleta's Kraal, P.O. Box 4, Bulawayo.
F. E. Moony, Bantu, Nyamandhlovu.
J. Moore, Kennebec and Pompoenpoort, Nyamandhlovu.
W. C. Morgan, Harris and Redleaf, Morgan's Spur.
G. H. Olsen, Carlsville, P.B. Redbank.
C. M. Parry, Nyogeni and Compensation, Nyamandhlovu.
E. Richardson, Maryland, Nyamandhlovu.
C. Salmon, Cawston Block, Nyamandhlovu.
C. R. Sparrow, Mt. Pleasant and Mgyzaan, Nyamandhlovu.
T. M. Thomas, Shiloh, Umzingwane, Heany Junction.
S. F. Townsend, Redbank "A," P.O. Box 215, Bulawayo.
E. G. Usher, Manilla and Elstobs, P.O. Figtree.
Dan Vincent, Vincent's, P.O. Box 573, Bulawayo.
W. A. Watt, Woodstock, Marula.
G. Wallace Williams, Ntandan, P.O. Box 218, Bulawayo.
F. C. Woods, Mimosa Park and Mimosa Park East, P.O. Box 573, Bulawayo.

BULALIMA-MANGWE.

Rev. W. W. Anderson, Dombodema, Plumtree.
A. Barclay, Inane and Redhill and Cromatie and Sevaka, Plumtree.
E. V. Barnes, Norton, Figtree.
A. Birnie, Inverugie and Manda, Marula Siding.
D. A. Blumberg, Marcedale, P.O. Box 409, Bulawayo.
A. J. Brittain, Tempe, Sandown.
A. F. Broomhead, Bathdale, Plumtree.
H. M. Butler, Gilford and Gilford Extension, Francistown.
L. J. Champion, Pandis and s.d. Manda and s.d. Sherwood, P.O. Box 111, Bulawayo.
C. P. Clarke, Natane, Syringa.
E. F. Clayton, Longlands, Marula.
R. A. Cooke, Gungwe, c/o Tati Concessions, Tsessebe.
Cooper & Nephews, Stretton and Wilton and Edendale, Sandown Siding.
Dawes & Durrett, Glamorgan, Belingwe.

P. de Bene, Luscombe and Huntingdon, Plumtree.
J. H. Dell, Woodleigh "A," Figtree.
Difford & Daniel, Blackwater, Francistown.
W. Draper, Eden and Catford, Nyamandhlovu.
W. W. Estment, Sunridge, Plumtree.
G. Fath, Maakwa and Fairfield and Vevendale and Braemore and Martindale, P.O. Plumtree.
C. Flottow, Maholi, P.B. Syringa.
C. D. Forbes, Good Hope and Peace and Mamre and Mizpah, Dornock Estate, Sandown.
C. A. Fraser, Grootfontein and Alexander and Kiaiti, Syringa.
G. Gelibrand, Parkroe, Plumtree.
Goddard Bros., Manifest, P.O. Plumtree.
R. Granger, Springfontein and Monaro, Figtree.
P. J. Greef, Shashimangwe and Jim, Marula Tank.
D. Greer, Westfield, Inyati.
Hammond & Watson, Bushhill, Plumtree.
M. J. Herbst, Forwards Remainder, P.O. Figtree.
J. A. Herbst, Clifton, P.O. Figtree.
Horton & Williams, Kalaka and Ladywell, Nyamandhlovu.
McW. Ingram, Garth and Springfields, Marula.
N. & A. Jamieson, Hillocks, Plumtree.
I. Kollenberg & Co., Oakvale and Glencoe, Plumtree.
Laing Bros., McGeer's Luck and Tweedale, Figtree.
A. le Boeuf, Empandeni, Plumtree.
Hans Lee, Sterkfontein, Plumtree.
Lee & Lamb, Sunnyside and Watwood, P.B. Sandown.
D. R. Lewis, Lewisdale, Plumtree.
H. Leyard, Stylefontein, Plumtree.
M. F. McKinley, Greystone, Syringa.
T. McKinley, Glenmore, Syringa.
T. McMurray, Tjankwa and Despatch and Vlakfontein, Grand Hotel, Bulawayo.
J. C. Moffat, Elstub's Grant, P.O. Figtree.
G. C. C. Montgomery, Lion's Park and remainder Sargento and Pleasant View and Reserve, Figtree.
S. Moore, Sedgwick Extension, Nyamandhlovu.
W. Murgatroyd, Brantwood, Plumtree.
M. Payne, Summerton, Plumtree.
J. E. Peach, Springvale, Figtree.
W. Pook, Coldridge, Plumtree.
B. Prescott, Prescott's, P.O. Marula.
A. C. Pyke, Elma and Zareba, Syringa Siding.
T. W. Quested, Shesha Mangwe and Holmwood, Plumtree.
F. Rayner, Tjompani, Plumtree.
T. S. Rhoades, Catford, Mpanya, Manza and Riverbank, Luchabi Estate, Nyamandhlovu.
J. G. Riach, Orange Grove, Plumtree.
C. S. Rix, Piniridge, Plumtree.
W. H. Robertson, Aberdour, P.O. Sandown.
D. Rolland, Anfield, Syringa.
S. J. Rosenfels, Lydeard and Dawsons, Stokestown, Warneford and Shashani, Marula.
J. R. Rowland, Kensington, P.O. Box 202, Salisbury.
K. Ruth, Good Luck, Marula.
Ryan & Burton, Aliwal, Marula.
P. S. Sale, Dryden, Plumtree.
E. Shaw, Monearn, P.B. Syringa Siding.

J. C. Shone, Wilfred's Hope, Marula, Bulalima-Mangwe.
H. Simpson, Leighwoods, Leighwoods.
W. M. Smith, Syringa Vale, P.O. Marula.
S. H. Smith, Maldon, Plumtree.
J. W. Spencer, Mananda Nos. 3 and 7, P.O. Marula.
G. Steer, Springvale "B," Figtree.
I. Stern, Roscommon and Twinstone, Plumtree.
F. Stock, Watershed, Mendip View, Syringa.
A. T. Taylor, Avoca, Plumtree.
Taylor & Mullins, Mt. Pleasant, Antelope Mine, Matopos.
J. H. Usher, Woodleigh, P.O. Figtree.
C. J. van Rooyen, Van Rooyen's Rest and Weltevreden, Plumtree.
A. Vickery, Boolie and Driehoek, P.O. Marula Siding.
S. A. Viljoen, Stonehills, Marula, *via* Bulawayo.
W. C. Walston, S.D.A. Mission Farm, Solusi Mission, Bulawayo.
A. S. Will, Beauly, P.B. Sandown.
K. R. Williams, Caterham Valley and Paul's Rest, Figtree.
R. Williams, Holdstock and Koodoo Kop, Syringa Siding.
E. F. Willmore, Retreat and Excess, Plumtree.
G. C. Wilson, Crediton, Birdspring and Chezu, Plumtree.
P. M. Windeatt, Standon, Sandown.
P. Wolf, Burntside, Plumtree.
J. B. York, Fairview, Sandown Siding.

MATOBO.

Antelope Mine, Thaba's Nyoni, Antelope Mine, Matopos.
J. Brebner, Usher No. 1 and Chelston and Tschabalala, P.O. Box 660, Bulawayo.
F. Brown, Toko North, P.O. Sibali.
J. Cairns, Ravenswood, P.O. Figtree Station.
Callendar & Bourdillion, Tonbridge, Matopos.
G. E. Cockcroft, Holly's Hope, P.B. Matopos.
W. E. Dowsett, Hazelside, Matopos.
J. C. du Preez, Undza, Sibali.
W. S. du Plessis, Matibi, P.O. Sibali.
F. G. Elliott, Condross Park and Sala, Melsetter.
S. A. Fordham, Chivedon, c/o W. Lees, Alali Farm, Matopos.
L. Fox & Co., Malaje and Senungu, Antelope Mine, Matopos.
George & Gillespie, Holi, P.O. Sibali, Matopos.
W. Gray, Sibali, c/o W. Lees, Alali Farm, Matopos.
E. A. Hull, Westacre Creek, Matopos.
H. M. Huntley, Sauerdale and Merino Walk, P.O. Box 147, Bulawayo.
A. Johnson, Valley, Sibali.
W. H. Jones, Anglesea, Matopos Terminus.
J. D. O. Landsberg, Togher, Antelope Mine, Matopos.
Wm. Lees, Alali and Ovi South, P.B. Matopos.
A. Leslie, Duta, Sibali, Matopos.
L. Mee, Pagati, P.O. Sibali.
A. J. Read, Lushongwe, P.O. Sibali.
W. C. B. Robinson, Sinumi, P.O. Sibali.
P. H. Ross, Mangoni, Matopos.
T. Sanson, Mineral King, P.O. Matopos.
J. S. Stoole, Vimbi, P.O. Sibali.
J. T. Tait, D'Hoop, Figtree.
P. J. van der Merwe, Damara, P.O. Sibali.
S. D. van Tonder, Store, P.O. Sibali.
L. C. van Vuuren, Sivumi, P.O. Sibali.

C. F. van Zijl, Driefontein, P.O. Figtree.
C. J. Webb, Longsdale, Matopos.
W. F. White, Mavuli, Store, Laconcorde and Vriegeright North, Figtree Station.
J. Whiteside, Cementary and Mali, Tjimali, Marula.
G. H. Wood, Natisa, P.O. Sibali, Matopos.
W. M. Wood, Vriegeright South, Figtree.

UMZINGWANE.

A. Adams, Swartspruit, Filabusi.
A. J. Bolton, Limerick, Balla Balla.
M. Brande, Howard's and Glen Montagu, P.O. Box 369, Bulawayo.
T. J. Burns, Lot No. 18, Essexvale Estate, Essexvale.
A. R. Crombie, Gum Tree and Lot No. 6, Umgusa, P.O. Box 383, Bulawayo.
O. L. Edwards, Douglasdale, P.O. Box 61, Bulawayo.
H. P. Holl, Springvale and Napiersville, P.B. Maguga Halt.
N. Jones, Hope Fountain, P.O. Box 283, Bulawayo.
Louw Bros., Kirby Henderson, P.O. Irisvale Halt.
J. L. Mitchell, Claremont, P.O. Box 262, Bulawayo.
R. Moubray, Springvale, Bushtick Siding.
Col. W. Napier, Springs, Duneal, Hope Valley and Wilsondale, P.O. Box 473, Bulawayo.
J. P. Richardson, The Homestead, Essexvale.
G. Robinson, Spitzkop, P.O. Bushtick Siding.
A. Rorke, Emangeni, P.O. Box 283, Bulawayo.
M. J. Rorke, Crocodile Valley, P.B. Bulawayo.
T. A. Russell, Enyema, Balla Balla.
J. W. Terblanche, White's Run, Heany Junction.

BULAWAYO.

W. J. Atterbury, Hyde Park Extension and Irene, P.O. Box 26, Bulawayo.
C. Austen, Imbezu Kraal, P.O. Box 199, Bulawayo.
F. Bennett, Vailima Dairy and Umgusa Estates, P.O. Box 72, Bulawayo.
W. H. Bain, Hopedale and Umguza Plots, P.O. Box 55, Bulawayo.
O. A. Barton Tharle, Lynwood Estate, P.O. Box 599, Bulawayo.
H. H. J. Blackie, Reigate and s.d. T. of Helenvale, P.O. Box 346, Bulawayo.
D. C. Bovill, Helenvale No. 15, P.O. Box 242, Bulawayo.
I. J. Boyers, Mapani, P.O. Box 416, Bulawayo.
A. E. Brewer, Klipspring and Joe's Luck, Westacre, P.O. Figtree.
Carlisle & Pascoe, Millievale, P.O. Box 25, Bulawayo.
H. Clarke, Lower Rangemore and Middle Dunstal, P.O. Box 360, Bulawayo.
Thos. Craig, Norwood, P.O. Box 17, Bulawayo.
G. Cumming, Hilton, P.O. Box 314, Bulawayo.
Mrs. G. C. Davis, Orange Grove, P.O. Box 401, Bulawayo.
De Beer & Dyer, Helenvale No. 13, P.O. Box 13, Bulawayo.
C. R. Edmonds, Sailor's Hope, Launchestsy, Woodvale, Mopani, P.O. Box 264, Bulawayo.
C. R. English, Fairview, P.B. Khami Siding.
W. V. Fleming, Rosebank, P.O. Box 34, Bulawayo.
Fleming's Matabele Exp. Co., Ltd., P.O. Box 26, Bulawayo.
R. A. Fletcher, Upper Nondweni and Upper Umvutcha, Umvutcha and Zimbili, P.O. Box 71, Bulawayo.
Foulsham & Davies, Homeland, Bulawayo.
E. Gardner, Belle View, P.O. Box 51, Bulawayo.
F. E. Goodridge, Keendale, P.O. Box 200, Bulawayo.

H. M. Greenspan, Ireland, P.O. Box 492, Bulawayo.
A. G. Hay, Umganine, P.O. Box 177, Bulawayo.
F. Head, Imperial Farm, P.O. Box 702, Bulawayo.
Miss Henderson, Mbuyasiwe, P.O. Box 670, Bulawayo.
J. A. Innes, Honeybird Kop, Figtree.
J. Jamieson, Roseburn, P.O. Box 481, Bulawayo.
T. Gordon Kay, Chelmer, P.O. Box 606, Bulawayo.
A. MacDonald, Slights, P.O. Box 297, Bulawayo.
Mashonaland Agency, Ltd., P.O. Box 227, Bulawayo.
E. M. T. Mitchell, Hyde Park, Stock Exchange Buildings, Bulawayo.
Mrs. G. Montgomery, Trenance, P.O. Box 286, Bulawayo.
Nicholson Bros., Mayfield and Hyde Park (part), P.O. Box 544, Bulawayo.
J. Otter, Trenance No. 2, P.O. Box 17, Bulawayo.
Rhodesia Land & Cattle Co., Exchange, Judds, and Railway Block, P.O. Box 13, Bulawayo.
A. B. Rutherford, Stoneycroft, Bulawayo.
E. Schenk, Umvutcha Lower, Bulawayo.
Miss A. Skey, Dunstal No. 1 and Khami, P.O. Box 181, Bulawayo.
J. W. Sly, Helenvale Nos. 8, 9 and 10, P.O. Box 582, Bulawayo.
C. J. Stacey, Dewsbury, P.O. Box 188, Bulawayo.
G. R. Stubbing, Umkien, P.O. Box 572, Bulawayo.
A. van Blerk, Craiglee, P.O. Bulawayo.
F. D. Walker, Aisleby, P.O. Box 89, Bulawayo.
C. M. White, Montgomery, P.O. Box 444, Bulawayo.
H. R. White, Trenance North, P.O. Box 447, Bulawayo.
C. H. Zeederberg & Co., Zeederberg's Block, P.O. Box 165, Bulawayo.

BUBI.

C. W. Adams, Wynslay Estate and Exchange, Inyati.
V. C. Andrews, Formona, P.O. Queen's Mine, Bembesi.
J. H. Bailey, Leighton, P.O. Lonely Mine.
E. Becker, Gravesend, Bembesi.
B. W. Bell, Redesdale, Lonely Mine.
L. Berwitz, Ventnor, P.O. Lonely Mine.
S. H. Boright, Inumwa Ranch and Extension, P.O. Lonely Mine.
E. W. Bosomworth, Lortondale, Elumbo Mine, Bulawayo.
C. Brown, Redcliffe, P.O. Bulawayo.
B.S.A. Co., Pongo Farm, Shangani Reserve and Shangani Outspan, Shangani Estates.
J. Carpenter, Mancott "A," Lonely, Inyati.
T. Caugherty, Imbesu Park (lower part), Heany Junction, Bulawayo.
J. M. Constable, Cowdray Park, Heany Junction, Bulawayo.
W. J. Cooper, Lavendon Grange, P.O. Inyati.
J. O. Den, Imbesu Estate, P.O. Box 237, Bulawayo.
V. M. Ewing, Braemar Ranch, P.O. Inyati.
H. T. Fynn, Annaly & Induba, P.O. Queen's Mine.
H. P. Fynn, Bembesi Valley and Mayo, Fynn's, etc., Bembesi.
J. E. Gell, Imbezu Park (part), Heany Junction.
W. Hatfield, St. Aidan's Mission, Lochard Siding.
G. H. Huckle, Croome, Inyati.
H. C. Ind, Killegar "A," Kildallon and Loxley Coome, P.O. Lonely Mine.
T. S. Laidley, Dingaan, P.B. Bulawayo.
W. Long, Glen Karney, P.O. Lonely.
Sur.-Major J. E. Martin, Melani's Plot, Inyati.
A. McMaster, Allendale, Insiza Station.
Mosley Bros., Courtleigh, Inyati.
H. Mostert, Bembesi Drift, Queen's Mine.

G. O'Donovan, Britwell and Cubbie and Avilion, Bindura.
S. O'Keefe, Clonmore, Bembesi.
H. A. Payne, Waterfall, P.O. Queen's Mine, Bulawayo.
A. Rabe, Oscardale and St. Ninian's, Insiza.
Ralstein Bros., Umsangwa Ranch, Insiza Station.
A. S. Richardson, Gravesend Estate, s.d.'s D, C, F, G, J, K, P.B. Lochard Siding.
Roberts & Letts, Maldon, Heany Junction.
T. S. Ruddle, Pentridge, P.O. Shangani.
H. Ryan, Esymangene Block, Shangani.
W. A. Ryan, Dagmar, Hunter's Road, Bulawayo.
R. P. Sanderson, Maxim Hill, Heany Junction.
B. Shemer, Baltimore, Shemer's and St. Beldon's, P.O. Insiza.
J. H. Smith, Felix, P.O. Queen's, Bulawayo.
E. C. Streak, Robin's, Lochard Siding.
J. B. West, Robert Block, P.O. Queen's Mine.
H. A. White, White's Farm, and Tara "A" and "B," P.O. Lonely Mine.
H. H. Williams, Huntsman, and Scots Portive, Inyati.
D. E. Williams, Hurst, Inyati.
F. A. Wilson, Bala and Riverbank, c/o Queen's Mine.

INSIZA.

A. Allen, Magohlo, Insiza.
H. B. Ashburner, Kya Lani and Vischia, P.B. Insiza.
C. Atkinson, Rietfontein, Insiza.
H. P. Bakkes, Koodoosrand, Shangani.
J. C. Basson, Nelly's Vlei, P.O. Shangani.
H. S. Bawden, Glenorchie, Dingaan, Albany, Arupanji, Forfar, McGowan's and Lochard Block, Insiza.
B. A. Bland, Thornville, Shangani.
W. E. T. Bolitho, Trevelloe and Parkyns and Blackwaters, Shangani.
G. W. Bredenkamp, Pioneer Rest, Balla Balla.
J. Campbell, Lancaster, P.O. Box 227, Bulawayo.
A. Carlson, Blackwaters, Insiza.
H. N. Chawner, Masiele East, Insiza.
R. J. Clarke, Beybur, Insiza.
R. Cloete, The Glade, P.O. Shangani.
M. C. Dedman, Ripley, Shangani.
M. R. Eva, Riverton and Roodeheuval, Shangani.
W. E. Farrer, Leeuwhoek and Scaleby, Fort Rixon.
J. Foster, Nauhoho, P.O. Bembesi.
F. A. Gooch, The Fountains and Blinkbonny, Murray's, Insiza.
L. Granger, Uyamazi, Filabusi.
Col. Grey, Glenavon, c/o H. Bawden, Glenorchie, P.O. Insiza.
W. J. B. Harris, Hlohlo, Woodstock and Infiningwe, Fort Rixon.
J. L. Henderson, Goldfields, Flora Mine, Filabusi.
N. C. Jackson, Ferncreek, Shangani.
A. Janjetich, Good Luck, West Nicholson.
J. F. Janjetich, Good Hope, West Nicholson.
Miss F. E. Jones, Innisfallen and Innisrisen, Fort Rixon.
M. Kerr, Inkubu, P.O. Belingwe.
A. Kooy, Fochabers, Bembesi Station.
H. S. Langdon, Blackwaters, Wenton Farm, Shangani.
A. J. Lassman, Inyese and Impala and Inkwakwine, P.O. Filabusi.
W. Looy, Brown's, Somabula.
A. H. O. Louw, Wolf's Crag, P.O. Shangani, Bulawayo.
W. Luis, Woodborne, Peggy Mine, P.O. Insiza.
W. P. Lynch, Fochabers, Bembesi.

G. MacKenzie, Bon Accord, Shangani.
R. P. MacDonald, Kogha, P.O. Peggy, Insiza.
T. Meikle, Leachdale, Vungu, Dandasi, Glencoe, Shangani, Exchange, Tonwa, Ismangene, Bulawayo.
H. U. Moffat, Oaklands, P.O. Box 592, Bulawayo.
H. Muller, Greystone, P.O. Shangani.
C. S. Nel, Stoneham South and Wesselline, Shangani.
D. A. Nolte, Lavinia, P.O. Peggy, Insiza.
G. C. Oliver, Allendale, Insiza Station.
L. M. Papenfus, Fletcher's, c/o W. P. Lynch, Fochabers, Bembesi.
J. E. Penny, Liscard, Shangani.
C. Pullen, Indutywa, P.O. Nelly Store, Insiza.
Ralstein Bros., Arcadia, Filabusi.
A. S. Richardson, Lochard Ranch, P.B. Lochard Siding.
F. F. Rose, Rosedale, Shangani.
Rhodesia, Ltd., Glass Block Ranch, Balla Balla.
J. H. Roux, Oboscos, P.O. Peggy, Insiza.
T. J. Smith, Nauhoho, P.O. Bembesi.
J. J. Smith, Ebley, P.O. Peggy, Insiza.
P. Stapleberg, Nauhoho Block, P.O. Bembesi.
H. L. Stewart, Fletcher's, Jeffe's Reef, Filabusi.
J. R. Stewart, Battle and Poplars, Shangani.
P. L. Swart, M'lomo, Shangani.
J. Stoddart, Kildare, Fairview, Rietfontein, Lancaster, P.O. Peggy, Insiza.
R. Thwaites, Insinga, Filabusi.
L. J. van Aardt, Pumilanga, P.O. Belingwe.
I. van der de Merwe, Goededacht, Peggy, Insiza.
P. J. van der Walt, Nauhoho, Bembesi.
H. G. van Eyssen, De Beers' Ranch, Shangani.
S. J. Versfeld, The Glade, Orangedale, Shangani.
C. E. Viljoen, Rustgevonden, P.O. Peggy Mine.
H. C. M. Viljoen, Welgevonden, P.O. Shangani.
W. B. Walker, Allendale "B," Wessels and Greenlands, Lochard.
G. C. Watson, Pioneer, Insiza.
M. E. Weale, Tsinda, P.B. Shangani.
H. B. Welby, Fletcher's, Filabusi.
B. L. Whyte, Makovani Estate, Beauty, Hotchkiss, Insiza, Inyozan and Wessels' Block, Fort Rixon.
F. V. Williams, Ingwenya, c/o L. Granger, P.B. Filabusi.
A. W. Wilson, Perly Cross and Pioneer Block, Nelly Mine, Insiza.
F. J. Wynne, Weltevreden, Filabusi.
B. H. Zietsman, Quarrie Kraal, Shangani.

BELINGWE.

F. Barrett, Kanteweni, Belingwe.
C. Bikkers, Inhlaba, West Nicholson.
Dr. W. H. Bournes, Clonmore, Belingwe.
P. Carinus, Dumbarton and Lukotsi, Belingwe.
R. O. Carruthers, The Doro and Springvale, Belingwe.
Fowler & Inverdale, Grimstone, Belingwe.
A. D. Hall, M'Belingwe, Belingwe.
H. W. Hall, The Springs, Belingwe.
H. R. Lane, Tamba, West Nicholson.
H. L. Maidwell, Koodoo Vale, Belingwe.
J. J. Mathyssen, Mnene, c/o Rev. W. Skold, Belingwe.
Philips & Meikle, Lower Doro and Dumming, Belingwe.
W. H. Potbury, Bickwell, Belingwe.
G. J. Oosthuizen, Zinges, Belingwe.

Mrs. M. B. Rogers, Inkutu and Pepeluza, West Nicholson.
W. H. Rogers, Tshabezi, West Nicholson.
Rev. W. Skold, Mnene Mission Farm, P.O. Belingwe.
R. H. Urmson, Belingwe Block, Mooifontein and Kromdraai, P.B. Filabusi.
A. E. York, Highpeak, Belingwe.

GWANDA.

A. G. C. Allen, Makwe, c/o W. Lees, Alali Farm, Matopos.
Amalgamated Properties of Rhodesia, Wenlock, P.O. Box 13, Bulawayo.
A. Blumenthal, Insindi Block, Gwanda.
A. Blumenthal, Sizenzi, Macauley's and Grange, Gwanda.
J. J. de Beer, Konongwe, Gwanda.
M. Elliott, Mjeni and Kialami, Gwanda.
L. F. Griffiths, Msulungwe, Antelope Mine.
R. J. Howe, Doelfontein, Gwanda.
W. E. Hunt, Doelfontein and Nelson's, Big Ben Mine, Antenior Halt, Gwanda.
W. James, Galanyondo, Antelope Mine.
H. H. Leith, Wahmer and Umchabelo, Antelope Mine.
Liebig's Extract of Meat Co., Ltd., Wedza, Shobi, Wanezi, Jopempi, Mazunga, Gwanda.
B. A. Lund, Thornwood, P.O. Gwanda.
P. Nicolle, Longueville, P.B. Sabiwa Siding.
F. J. R. Peel, Shashani and Umfula, Gwanda.

SELUKWE.

H. C. Baker, Edward's, Selukwe.
J. Baron, Limerick and Umguruguru, P.O. Box 42, Selukwe.
R. K. Bath, Umcima, Wanderer Mine, Selukwe.
Bechuanaland Exploration Co., Ltd., Aberfoyle Block, Selukwe.
A. L. Botha, Vlakfontein, P.O. Selukwe.
W. E. Biddulph, Magakooshla, Selukwe.
P. D. Breen, Sebanga Poort, P.O. Selukwe.
J. Breen, Mt. Bougai, Selukwe.
F. Bridgman, Sebanga Poort, Chrome Mines, Selukwe.
E. Buckley, Hilton, P.O. Lalapanzi.
J. Buckley, Chiltern, Lalapanzi.
A. Crossley, Impali Source, P.O. Box 50, Selukwe.
H. du Plessis, Sebanga Poort, Chrome Mines, Selukwe.
F. du Plessis, Sebanga Poort, Chrome Mines, Selukwe.
Glen Rosa Syndicate, Impaluli, Selukwe.
W. Grant, Senanqwe, Selukwe.
S. Herud, Adare, Thusi and Donga "A," Selukwe.
A. Hogg, Hidden Treasure, Wanderer Mine.
W. Hogg, Dunsinane and Rio, Iron Mine Hill, Gwelo.
W. E. James, Impali Source, Division "A," P.O. Box 41, Selukwe.
C. Johnson, Tchibiwisa, Selukwe.
H. Long, Hillingdon, Selukwe.
Loquat Syndicate, Guru Guru, c/o R. C. Smith, Selukwe.
S. M. Marvos, Sebanga Poort, P.O. Selukwe.
H. M. S. Mayers, Ndwanga, Selukwe.
G. Mountford, Labongo, Selukwe.
Thos. Munro, Royston, Iron Mine Hill, Selukwe.
R. M. Nairn, Gundula and Guru Guru, Bulawayo.
T. Pedlow, Burns, Selukwe.
H. A. Riechert, Sebanga Poort, P.O. Selukwe.
L. Russell, Safago, Guinea Fowl, Gwelo.

J. D. Smith, Sebanga Poort, P.O. Selukwe.
R. C. Smith, Donga, Goli and part Impaluli, North Bonsor, Selukwe.
W. Smith, Adare, Selukwe.
A. Sokolich, Umcima, Wanderer Mine, Selukwe.
E. E. Somerset, Makomisa, Wanderer Mine, Selukwe.
Standage & Urwin, Merrow, Selukwe.
T. W. Taylor, Lancastershire Estate, P.B. Surprise Siding, Gwelo.
A. van Breda, Sebanga Poort, P.O. Selukwe.
T. B. von Blerk, Adare, P.O. Selukwe.
S. A. Waters, Adamantia, Selukwe.
F. Wilson, Adare, P.O. Selukwe.
Willoughby's Consolidated Co., Ltd., Adare, Selukwe.

GWELO.

C. Allen, Hagley, Iron Mine Hill.
S. Annandale, Annan Water, P.B. Somabula.
R. Ashwin, Wold, Lalapanzi.
J. Austen, Matchebel, Judd's, Brownriggs, Woodlands, Aspdale, Riverlea, and Knobbythorne, Que Que.
A. Bailey, Woolohra, c/o Drayton Bros, Umvuma.
Barrett Bros., Impala, c/o A. Paxton, Igogo, P.O. Que Que.
J. E. Batuis, Steinbok, Somabula.
C. F. Bertram, Holmdene, Gwelo.
P. Beyers, Iron Mine Hill, P.O. Iron Mine Hill.
S. Biffen, Rose, Lalapanzi.
R. A. Blake, Barkly, Adair, Gurfontein and Boschkloof, Gwelo.
G. B. Blaker, Anstruther's, c/o C. Allen, Iron Mine Hill.
W. J. Boggie, Craigevar, Netherby, "Craigevar," Gwelo.
J. F. Booyens, De Rust, Somabula.
F. E. Botha, Kenilworth "A," Daisyfield Siding, Gwelo.
Rev. A. J. Botha, Gwelo Commonage Plots 6 and 7, Daisyfield, *via* Bulawayo.
Miss Bowditch, Singari, Gwelo.
Bradford Bros., Dunrobin, Lalapanzi.
H. A. Bradley, Traveller's Rest and Hillside, P.O. Box 95, Gwelo.
A. J. Bradley, Lal Bagh, Longcliff and Usingwe Block, Gwelo.
A. K. Bridge, Watershed Block No. 4, P.O. Gwelo.
Tom Brown, Umsungwe Block, Plots 21 and 22, and Browndale, Gwelo.
E. A. Campbell, Nettlethorn and Redcliffe, P.O. Box 109, Gwelo.
E. Chapman, Killarney, Lalapanzi.
G. G. Chivers, Wildebeeste No. 28, P.O. Gwelo.
Coles & McKenzie, Umsukinen and Buda, Gwelo.
J. J. Conway, Erin, Que Que.
T. Cousins, Troy and Oaklands, P.O. Box 67, Gwelo.
T. W. V. Cross, Glenorchy, Iron Mine Hill.
A. J. Cunningham, Basildon, Que Que.
M. Danziger, Executor, Estate of the late D. H. Devonish, Watershed Block No. 3, P.O. Box 58, Gwelo.
Dr. J. Davey, Beere Manor, Que Que.
J. N. de Beer, Somabula Mission, Gwelo.
K. O. Dollar, The Grange, P.O. Box 56, Gwelo.
H. H. Donaldson, Faerdan, Iron Mine Hill, Gwelo.
W. G. Drayton, Grazing Grants 22 and 24, P.O. Box 282, Bulawayo.
L. E. Edwards, Middleton, P.B. Daisyfield.
J. H. Edwards, Kenilworth, Ruby Block, Merino Walk, Welcome Home, and Vungwana, P.B. Daisyfield Siding.
W. G. Elliot, Lochiel, P.O. Box 85, Gwelo.
P. R. Erasmus, Lovers' Walk and Vogelstruis, P.O. Box 96, Gwelo.

J. H. Erasmus, Vungu North, P.O. Box 96, Gwelo.
C. A. Fawcett, Rydal, Lalapanzi.
W. S. Ferguson, Pender, P.B. Somabula.
J. Ferguson, Marjoribanks, P.O. Box 55, Gwelo.
Globe & Phœnix G.M. Co., Ltd., East and West Que Que and Grasslands, Que Que.
H. H. Field, Krom River, Que Que.
J. W. Filmer, Chieftain, Iron Mine Hill.
K. A. S. Finnie, Headwaters and Braehead, Gwelo.
P. A. Fleming, Gwelo Small Holding No. 3, Gwelo.
H. C. Fletcher, River Bend Estates, P.B. Hunter's Road.
Mrs. A. Flint, Small Holding No. 30, P.O. Box 131, Gwelo.
J. W. Forrester, Forestvale, Globe & Phœnix G.M. Co., Ltd., Que Que.
Fotheringham & Rainsford, Hainhalt, Indiva Siding, Gwelo.
J. D. Fourie, Weltevreden, Daisyfield.
B. Fran, Garibaldi, P.O. Que Que.
P. H. S. Fouchee, Spes Bona, P.O. Gwelo.
W. Gatin, Umsungwe Plots 18 and 19, P.O. Box 94, Gwelo.
C. J. Griffith, Umsungwe Block No. 12, P.O. Box 74, Gwelo.
J. Gunn, Somabula, P.O. Box 48, Gwelo.
F. Hahn, Warringham and No. 10 West Gwelo Block, Somabula.
W. Halsey, Shawlands, Hunter's Road.
J. M. Harris, Redcliffe and Garryowen, Que Que.
F. A. Herbst, Sheep Run, Iron Mine Hill.
W. Holmes, Orphens and Melrose, P.B. Gwelo.
H. J. Horne, Prairie, Somabula.
Major W. Hurrell, Hurston and Foxton, Gwelo.
Geo. Hurtzig, Willoughby's Block, Umsungwe Plot No. 5, P.O. Box 24, Gwelo.
B. J. Ingle, Ifafa and Hillview, Lalapanzi.
T. Irving, Sweetwaters and Irving, Iron Mine Hill, Gwelo.
M. Jackson, Greenfels, Lalapanzi, Gwelo.
James & Worthington, Clifton Downes and Riverdale, Gwelo.
J. Jones, Wildebeeste Block, Walrus Mine, Guinea Fowl.
W. Kaschula, Gwelo Block West No. 20, Gwelo.
J. H. Kelly, Rhodesdale Ranch, Umvuma.
J. E. Knoesen, Roslin, Que Que.
C. J. Langton, Craigflower, Bell Mine, Que Que.
J. C. Liebenberg, St. Patrick, Somabula.
S. Levin, Keynshamburg, Camelia Mine, Gwelo.
A. W. Light, Christmas Gift, Gwelo.
H. Livingstone, Willoughby's Block, P.O. Gwelo.
F. W. Maisch, Tweestroom and Elizabeth, Lalapanzi.
P. A. Fleming, Curator Bonis, Estate late C. Maleham, East Clare Block, P.O. Box 2, Gwelo.
Major Marshall, Somerset Estate, Shamrock, Gwelo.
A. E. Mathews, The Swallows, Gwelo.
A. McAllister, Woodendhove, Lalapanzi.
E. McCabe, Monteith, P.O. Gwelo.
T. McConkey, Glen Arroch, Aberdeen Mine, Gwelo.
A. McDonald, Somabula, P.O. Gwelo.
W. S. Mitchell, South View, Iron Mine Hill.
Morrisby Bros., Sunnyside, Gwelo.
L. Natkin, Main Belt Block, P.O. Box 509, Que Que.
T. Nelson, Game Park, Gwelo.
B. P. Nichols, Staines, P.O. Box 55, Gwelo.
Miss E. O'Connell, Kilgory, Gwelo.
A. J. T. Olivier, Dewhurst, Somabula.

G. C. H. Olivier, Kenilworth "D," Daisyfield Siding.
D. J. Oosthuizen, Dobi, Shorp Shire and Leo Hurst, Gwelo.
H. Partridge, Partridge and Fricland, Beacon Farm, Lalapanzi.
K. H. Paxton, Igogo and Bembezaan and Impala, Que Que.
W. H. Perrott, Christmas Gift and Happy Valley, Gwelo.
H. Plumb, Indiva, P.B. Gwelo.
J. P. Pretorius, Sheltered Vale, Gwelo.
W. M. Pretorius, Plot 81, Willoughby's, Gwelo.
P. A. C. Raath, Downlands, Iron Mine Hill.
F. Rademeyer, Watershed Farm No. 5, P.O. Gwelo.
Mrs. L. M. Reed, Congella, Que Que.
Renton & Gray, Quorn, Cactus Mine, Que Que.
F. H. Rogers, Divide, Gwelo.
W. E. Sayer, Grassridge, P.O. Iron Mine Hill.
F. Seckel, Lalapanzi, Lalapanzi.
J. Seiler, Bijou and Plot Que Que, Gwelo.
F. G. Shaw, Chicago, Que Que.
A. P. Shone, Naseby and Wycherly, Que Que.
W. H. Simpson, Dalmeny, Iron Mine Hill.
Smith & Hikens, Suffolk, Giant Mine, Gadzema.
S. Smith, jnr., Henley, Gwelo.
G. F. Snyman, Kleinfontein, Iron Mine Hill.
S. Smith, snr., Walton, Gwelo.
Miss E. C. Steedman, Gando, Gwelo.
K. Stewart, Faerdan, c/o J. Picken, Faerdan, Iron Mine Hill.
J. Stow, Fairview, Somabula.
A. de B. Spurr, Wildebeeste Block and Fairdale, Gwelo.
W. T. Summers, Linsdale, Gwelo.
F. A. Taylor, Crossmaloof, Iron Mine Hill.
L. Thackwray, Surprise Farm, Gwelo.
J. Timmins, Netherburn, Lalapanzi.
A. Trollip, Guburia and Indiva, P.B. Glencraig, P.O. Gwelo.
R. W. Twilley, Wegdraai and Crossroads, P.B. Hunter's Road, Gwelo.
A. V. Tyrrell, Wildebeeste Plot 52 and Highlands, Tebekwe Mine, Selukwe.
H. C. van der Plank, Snowdon, Iron Mine Hill.
J. van der Westhuizen, Willoughby's Block, P.O. Gwelo.
J. J. van Heerden, Hammond, Lalapanzi.
W. van Heerden, Fernside, P.O. Umvuma.
G. P. Viljoen, West Rapids, Daisyfield Siding.
F. A. Walling, Bremeridge, Gwelo.
W. W. Watkinson, Clearwater, Hunter's Road.
G. Watkinson, Long Valley, Hunter's Road.
J. W. Watkinson, Northfields, Hunter's Road.
A. C. Watt, Argyle, P.O. Que Que.
P. T. Webb, Holdene and Sheep Run No. 1, Iron Mine Hill, Gwelo.
Mrs. D. Weston, Glen Ogilvy, Gwelo.
A. E. White, Christmas Gift and Chertsey, P.O. Box 100, Gwelo.
D. E. Wilkinson, Foudon, P.O. Shamrock, Gwelo.
T. Wotherspoon, Uplands s.d. "A," Lalapanzi.
H. L. Williams, Rutland, P.O. Box 30, Gwelo.

GUTU.

W. A. Bezuidenhout, Silverdale and Lionsdale, Enkeldoorn.
J. B. Boshoff, Welvaart, Enkeldoorn.
W. H. Burrows & Sons, M'Vimvi Ranch, P.O. Felixburg.
F. F. Heckler, Blyth, Makowries.
E. T. Kenny, Noeldale, Gutu.
J. H. Levason, Ferndown, P.O. Felixburg.

C. B. Mackintosh, Fairlie and Irvine, Felixburg.
Rev. G. S. Murray, Gutu Mission, Gutu, *via* Gwelo.
W. Napier, Eastdale, Umvuma.
J. H. Nieuaber, Tel-el Kebir, Felixburg.
J. H. Olivier, Lorn, Felixburg.
T. C. Prinsloo, Athol, Felixburg.
D. R. R. Pyewell, Glenary, Makowries.
H. M. Smart, Mar, Gwelo.
J. van Aswegan, Airlie, Felixburg.
W. D. van Helsdingen, Geluk, Enkeldoorn.
J. C. Welman, Good Luck, Felixburg.
White Bros., Surat, P.O. Makowries.
Willoughby's Consolidated Co., Ltd., Eastdale Ranch, Gutu.

NDANGA.

H. Cox, Ashcombe, Rurgwe.
A. M. Hammann, Lemoenfontein, P.O. Fort Victoria.
A. W. Holman, Bikita, Ndanga.
E. K. Kiddle, Cleveland, Victoria.
Plant & Chambers, Chiredzi Ranch, Ndanga.
A. W. R. Rademeyer, Rurgwe, P.O. Ndanga, Victoria.
J. Rademeyer, Doornfontein, c/o N. Richards, Salemore, Fort Victoria.
W. B. Richards, Marah Ranch and Mispah, Victoria.
N. Richards, Salemore, Fort Victoria.
Mrs. G. G. Williams, Iram and Cheek, Ndanga, Victoria.

CHIBI.

F. Barker, Golden Hill, Chibi, near Victoria.
T. W. James, Chilanga, *via* Great Zimbabwe.
H. W. Posselt, Nuanetsi Ranch, Great Zimbabwe.

VICTORIA.

A. E. Ashley, Home Rule, P.O. Mashaba, Victoria.
E. M. Baden, Less's Plot, Victoria.
Rev. C. Bert, Gokomere Mission and Inyoni, Fort Victoria.
G. C. Bezuidenhout, Shizumbu, Victoria.
J. H. Bezuidenhout, Ballymore, P.O. Mashaba, Victoria.
A. M. Brand, Eland's Kop, Victoria.
W. H. Brown, Midstream, P.O. Box 18, Victoria.
Bushney & Egan, Brakfontein, Fort Victoria.
J. Carruthers (Estate of the late), Oatlands, c/o E. M. Baden, Box 9, Victoria.
J. W. Clark, Gorge Grange and Eythorne, P.B. Fort Victoria.
Erskine Bros., Townlands and Bannockburn, Victoria.
R. W. Evans, Makahori and Clerkdell, Victoria.
J. M. Fitzgerald, Desmond Dale and Desmond Extension, Fort Victoria.
E. V. Franklin, Lounton, Fort Victoria.
E. Frankis, Westfield, The Thragian and Howickdale, P.B. Fort Victoria.
B. A. W. Gietzmann, Thorne, Fort Victoria.
C. Gloss, Welgevonder and Kippure, Victoria.
W. Goddard, Junction Extension and Junction, Fort Victoria.
J. A. Halliday, Clipsham and Extension, Lothian, Victoria Ranch, Constance, Flesk, Sikato and Cradock, P.B. Victoria.
H. Harper, Nooitgedacht and Glenlivet, P.O. Box 18, Victoria.
L. R. Hartley, Ware's, Victoria.
S. J. Hawkins, Allanvale, P.O. Mashaba.

J. F. Herbst, Bon Accord and Lymington, c/o W. B. Richards, Marah Ranch, Victoria.
F. J. Heros, Tentergate, P.O. Victoria.
H. S. Hoatson, Brooklands, P.O. Box 27, Victoria.
J. Hongwe & Co., Rugby, Victoria.
R. N. Hughes, Beza and Beza Extension, Fort Victoria.
F. W. Hunt, Riverdene and Verlos, c/o J. W. Clark, Gorge Grange, P.B. Victoria.
G. M. Huntley, Madzebeni, Victoria.
A. Jackson, Le Rhone, P.O. Zimbabwe, Victoria.
J. Johnstone, Hampstead, Victoria.
S. & A. Jones, Stanmore, Fort Victoria.
J. H. Kinnear, Cairn-na-Cuihme and Cluny, Victoria.
B. Kouny, Southwell, P.O. Victoria.
Komo & Co., Erich Staal, P.O. Victoria.
M. Less, Bompst, Fort Victoria.
Rev. A. A. Louw, Morgenster and Capota, Zimbabwe.
P. Mirls, Austral, Mashaba.
J. D. Moller, Arewa, Fort Victoria.
Moody & Ward, Climax and Redmond, c/o R. W. Evans, Makahori, Victoria.
F. Nelson, Liberty, Fort Victoria.
M. H. Nolan, Marthadale, Victoria.
W. L. R. Paley, Waterhole, P.O. Box 29, Victoria.
F. J. Potgieter, Bonair, Victoria.
F. A. Readman, Campsie Glen, Fort Victoria.
W. B. Richards, Nenga, Victoria.
D. J. Rossouw, Matzimberi, Fort Victoria.
J. Rutherford, Riverside, Fort Victoria.
G. F. Robertson, Brucehame, Victoria.
C. J. Strijdom, Welkomhoek, P.O. Victoria.
L. P. Spies, Springfield, Sand-drift and Good Hope, Victoria.
J. Struthers, Summerton, Southborough, Cambria, Winterton, Waverley and Dromore, P.O. Box 5, Victoria.
H. Taylor, Tokwedale, Mashaba, Victoria.
J. E. Titterton, Clifton, Zimbabwe.
J. Vermaak, Drieriver, Victoria.
S. & C. N. Wallace, The Retreat, P.O. Zimbabwe, Fort Victoria.
L. C. Warwick, Tokwe Ranch, Victoria.
J. H. Williams, Newlands, Newlake, Brackfontein, Rockwood, Longlands and Airdmhor, Victoria.

CHILIMANZI.

Beattie & Barnett, Wylde Grove, Alanberry and Cairngall, P.O. Box 25, Umvuma.
E. C. Boardman, Smilingvale, Felixburg.
C. C. Cocklin, Finalie, Nyombo Siding, P.O. Umvuma.
O. Chomse, Beema, Felixburg.
W. Cormick, Tendelle, Pezulu and Hlabati, Tendelle Estates, P.O. Umvuma.
W. Cormick, Richmond, Umvuma.
D. Davies, Llandebie, Umvuma.
T. H. Davison, Grootfontein, c/o E. G. Raubenheimer, Rubenvale, Umvuma.
F. C. de Klerk, Fenale, Umvuma.
D. J. du Plooy, Palmieffontein and Orangia, Umvuma.
D. W. du Plooy, Vredelust, Umvuma.
J. Edwards, Good Hope, Umvuma.
J. C. Elworthy, Vosges and Kombisa, Falcon Mines, Umvuma.

Falcon Mines, Chesa, Umvuma.
F. W. Gilfillan, Uamvar, Umvuma.
W. H. Gilfillan, Palgrave, P.B. Umvuma.
H. Gordon, Woodlands, Umvuma.
Grobler Bros., Rijsfontein, Umvuma.
E. G. Hallam, Lovedale, Umvuma.
W. G. Hammon, Mooifontein, Umvuma.
A. T. Holland, Thornhill and Elmwood, Chilimanzi, *via* Gwelo.
P. H. Lategan, Eland's Vlei and Stilsand, P.O. 29, Umvuma.
J. L. Lategan, Mooiplaats, Umvuma.
R. J. Layard, Chakastad, Felixburg.
A. Logan, Pagati and Lynwood, Umvuma.
J. Mathieson, Badsa and Sevilla, P.B. Umvuma.
G. C. M. Millar, Fairfield and Ruqueza, c/o B. M. Yorke, Umvuma.
W. Nanhaus, Grassland, P.O. Felixburg.
W. Napier, Orton's Drift and Swart River Junction, The Springs, Umvuma.
R. B. Nash, Walden, Umvuma.
J. H. Oliver, Sandfontein, P.O. Umvuma.
B. M. Olivier, Vosgesdale, Umvuma.
B. J. Palmer, Bucks, P.O. Gwelo.
A. Peck, Makowries, Makowries.
W. Posselt, Felixburg, Felixburg.
L. Prinsloo, Bultfontein, P.O. Umvuma.
P. H. Rademeyer, Collins, Felixburg.
E. G. Raubenheimer, Zondagsfontein, Van Zijl, Rubenvale and Jesmint, Umvuma.
E. Schmitz, Driefontein "A" and "B," Umvuma.
J. L. Smit, Gusseen, P.B. Nyombi Siding, Umvuma.
C. K. Seagrove, Ensinoen, Fairview and Murchiston, P.O. Box 82, Gatooma.
J. A. Steijn, Intete, Umvuma.
J. Symington, Scotland, Umvuma.
G. J. Smith, Smithvale, Umvuma.
Gen. H. A. Tagart, Cibi, Induna and Highlands, Induna Estates, Umvuma.
N. van der Berg, Good Hope, Felixburg.
Wolffe Bros., Nooitgedacht and Judea, P.O. Umvuma.
W. Wilson, Blackwood, P.O. Box 8, Umvuma.
B. M. Yorke, Fairfield and Ruqueza, "Fairfield," Umvuma.

CHARTER.

J. C. Barnard, Stockdale, The Range, Enkeldoorn.
B. H. Bester, Rietkop and Bestersrust, Enkeldoorn.
P. O. Brocklehurst, Antelope and Chigarra, Umvuma.
P. O. Brocklehurst, Belvois Spinny and Kaalplaats, P.O. Enkeldoorn.
W. W. Coetzee, Spurwing, The Range.
T. G. Coetzee, Nieuwjaarsfontein, Riversdale, P.B. Enkeldoorn.
H. S. Coetzee, Riversdale, P.B. Enkeldoorn.
Rev. A. S. Cripps, Moneyputt, Muckleneuk and Maranda Mashanu, Enkeldoorn.
G. W. Cummings, Hilton, Enkeldoorn.
W. P. de Klerk, N'gezi Poort, Enkeldoorn.
L. C. de Klerk, Wonderklip, Enkeldoorn.
D. B. Delport, Delport Wish, Enkeldoorn.
J. P. L. de Smidt, Brabant, C.C., Gwelo.
J. I. de Wet, Leeuwfontein, Enkeldoorn.
R. Duncan, Nora Lee and Altona, Enkeldoorn.

S. J. J. Erasmus, Vroogeveldt, Umvuma.
H. L. Ferreira, Swaartfontein, P.O. Enkeldoorn.
Ferreira & Shaw, Good Hope, Enkeldoorn.
P. E. Fuller, Charter Estate. Marshbrook.
H. Gagiano, Kwesfontein, Enkeldoorn.
A. W. Gardner, Zaramakas, Enkeldoorn, Charter.
W. P. Gilpin, Bushy Park, Umvuma.
A. C. Halgryn, Jackalsdraai, P.O. Enkeldoorn.
J. Harvie, Glenfinnan, Harvieston, Enkeldoorn.
A. J. Heyns, P.O. Enkeldoorn.
J. P. Hoffman, Pennyfather, P.O. Enkeldoorn.
L. J. Hoffman, Mexico and Addelienio, P.O. Enkeldoorn.
H. H. Hulley, Honey Spruit, Enkeldoorn.
C. J. A. Kirstein, Inhoek, Enkeldoorn.
J. P. B. H. Kirstein, Kleinfontein, Enkeldoorn.
G. S. Kok, Glenconnor, P.O. Enkeldoorn.
J. C. Kriek, Jackalsbank, Enkeldoorn.
N. Kruger, Allandale, Enkeldoorn.
C. W. Lamprecht, Opal, Uitkijk, Enkeldoorn.
C. Lamprecht, Uitkijk, Enkeldoorn.
A. H. Lategan, Veeplaats and Hugosfontein, Enkeldoorn.
A. F. le Roux, Riversdale, P.B. Enkeldoorn.
C. R. Lombard, Kameellaagte, Enkeldoorn.
J. H. Lombard, Uitzicht, Enkeldoorn, Charter.
C. M. Ludlow, Just-in-Time, Enkeldoorn.
S. C. Moorcroft, Carruthersville, P.O. Marshbrook, *via* Salisbury.
J. P. Odendaal, Kwesfontein, Riversdale P.B., Enkeldoorn.
F. J. Posselt, Range "B," The Range, Enkeldoorn.
D. S. Redman, Redlands, Enkeldoorn.
Raubenheimer & Balne, Mooigelegen, Rubenvale, Umvuma.
E. Schultz, Slangfontein and Eminedale, Enkeldoorn.
C. J. Stals, Koodoospoort, c/o A. Liebenberg, Enkeldoorn.
I. R. Staples, Christiana, c/o D. Alyliff Tarr, Uitkijk, P.B. Enkeldoorn.
W. D. Stewart, Allandale, Enkeldoorn.
J. C. Stopforth, Landskroon and Silwaan, Enkeldoorn.
C. G. Tarr, Slangfontein, Marshbrook.
D. A. Tarr, Phillipsdale, c/o Lamprecht's P.B., Enkeldoorn.
Tarr & Whitfield, Ashton, Enkeldoorn.
Tarr & Sons, Featherstone, Enkeldoorn.
G. Tulley, Wiltshire Estate and Highway, Enkeldoorn.
B. H. van der Merwe, Duncanston, Charter.
T. M. van Niekerk, N'gzie, P.O. Marshbrook.
P. van Rooyen, Sterkstroom, Umvuma.
L. W. van Tonder, Onzerust and Rooibokfontein, Umvuma.
R. C. Vernon, Woodville and Girliesfontein, Enkeldoorn.
C. J. Walls, Glentovol, Enkeldoorn.
Welman & Barrey, Duiker, Enkeldoorn.
W. P. Welman, The Range, Enkeldoorn.
J. Wheeler, Wildebeestlaagte, Enkeldoorn.
J. W. Wray, Ulster, Enkeldoorn.

MARANDELLAS.

A. M. Adams, Inyati, Inoro, Marandellas.
Aitchison & Watson, Nolans, Collins and Heydon, Marandellas.
W. C. Bean, Ulva and Sannyfontein, Marandellas.
S. Boretta, P.O. Marandellas.
W. T. Bezuidenhout, Torridge, Marandellas.
F. Bezuidenhout, Salcombe, c/o E. S. Taylor, P.O. Rocky Spruit.

H. Bissett, Rocklands and Buckingham, Marandellas.
H. Bissett, March, Marandellas.
J. Bloom, Revolt, P.O. Box 473, Salisbury.
J. O. Blundell, Mawiri, P.O. Inoro, Marandellas.
J. J. Botha, Springfontein, P.O. Macheke.
— Bradfield, Swallowfield, Beatrice.
A. J. Bradshaw, Una, Fels and Shaka, Inoro.
J. J. J. Brits, Welgetroos, P.O. Marshbrook.
E. Burdett, Calne, P.O. Macheke.
W. Burnett, Huish and Lustleigh and Mt. Arthur, P.O. Mangwendi, Marandellas.
T. E. Coleman, Lowlands and Highlands, Macheke.
J. D. E. Collins, Skipton, P.O. Inoro, Marandellas.
Mrs. F. Cooksey, Devon and Eggsford, c/o A. W. Partridge, P.O. Box 124, Salisbury.
Cox Bros., Chiswana, P.O. Inoro, Marandellas.
J. W. Cronkamp, Plymtree, Marandellas.
A. H. Day, Pirate or Sable Range, Marandellas.
C. J. de Jager, Anwa and Rocklift, Macheke.
E. P. de Kock, Good Hope and Dorset, Marandellas.
C. de Villiers, Elandslaagte, Marandellas.
T. F. Dreyer, Par, Marshbrook.
R. B. Dryborough, Mari, P.O. Inoro, Marandellas.
Chas. Duncan, Fault & Isleham, Macheke.
J. H. Finch, Oxford, Marandellas.
J. W. Frost, snr., Saltash, P.O. Marshbrook.
C. C. Girdlestone, Mere, Marandellas.
P. Gwynne, Business Stands Nos. 1, 2 and 3, Marandellas Village, Marandellas.
M. Hayes, Kent, De Kock's Private Agency, Marandellas.
F. C. Hefer, Looe, Marandellas.
Henderson Bros., Injina, P.O. Inoro, Marandellas.
H. Higgs, Cornwall, Middlesex and Norfolk, Marandellas.
E. E. Homan, Longlands Estate, P.O. Box 80, Salisbury.
Hopley & Young, Hopley's and Wedge, and Fair Adventure, P.O. Inoro, Marandellas.
W. Hunter, Idapi, Marandellas.
W. E. James, Lesseyton, Hull and Lynton, Inoro, Marandellas.
A. B. Joffe, Idulu, P.O. Inoro, Marandellas.
P. W. Kidwell, Cotter, Marandellas.
King Bros., Cave, Macheke.
C. & E. Konschel, Rastenburg, P.O. Marandellas.
C. L. Kruger, Gatzi and Somerlust, Marandellas.
M. Lewis, Business Stands in Marandellas Village, Marandellas.
G. C. Lothian, Waterford, Marandellas.
Marandellas Development Scheme, Progress, Marandellas.
M. A. McCulloch, Dormervale, Weir and Argosy, Marandellas.
A. Main, Welcome Home and Springfield, Macheke.
G. S. MacGregor, Edinburgh, P.O. Inoro, Marandellas.
D. S. McLachlan, Uplands and Bonongwe, Marandellas.
Mungo Tobacco Plantation, Rundu and Mungo, Marandellas.
Dr. T. D. McLaren, Paradise Estate, c/o Dr. L. Lewis, Marandellas.
W. L. McLean, Bonn, Macheke.
S. C. Moorcroft, Corfe, P.O. Marshbrook, Salisbury.
E. W. Morris, Springvale and Rakodzi, Marandellas.
Morrison & Gibberd, Anstey, Sheffield and Kelvedon Estate, P.O. Inoro, Marandellas.
Mrs. Nesbitt, Tipperary, Marandellas.

A. J. H. Nicholson, Rocky, Ishtramore, Marandellas.
Dr. S. Osborn, Kwenda Mission, P.O. Inoro, Marandellas.
E. Pike, Stow, Marandellas.
A. W. Partridge, Lendy Estates, Alnwick, Newton, Rhodesdale, Exeter, Bunt, P.O. Box 124, Salisbury.
J. S. Preston, Nykururi, Tweejan and Mt. Rumudzi, Marandellas.
A. C. Reed, White Gambola, Macheke.
W. E. Rooke, Hedon, Marandellas.
Sakas & Co., T'dube, P.O. Inoro, Marandellas.
H. K. Scorror, Land Settlement and Inoro, Marandellas.
A. E. S. Scott, Numwa, P.O. Inoro, Marandellas.
G. Seagar, Nelson and Bita, P.O. Inoro, Marandellas.
M. J. Shapiro, Guzha & Mtuozekwe, P.O. Box 367, Salisbury.
A. W. B. Shawe, Clan William, Mangwendi, Marandellas.
L. Short, Fault, Macheke.
Rev. E. J. Simpson, Bovey Tracey and Mangwendi, Marandellas.
T. Sloan, Igudu, Marandellas.
J. W. Stanlake, Nenguba, Marandellas.
W. Steele, Gresham and Ballinard, Marandellas.
A. F. Stevens, Mont Clare and Half Rupture, Marandellas.
G. Stevens, Sussex, Marandellas.
J. Tanner, Cambridge, Marandellas.
R. J. Tarrant, Delta, Macheke.
H. O. Taylor, Bita, P.O. Inoro, Marandellas.
H. Taylor, Bolton and Corby, P.O. Inoro, Marandellas.
J. Thackara, Rapids, Marandellas.
E. A. Thornhill, Helm, Marandellas.
The Tobacco Co. of Rhodesia and S.A., Ltd., Bath, Nyeri and Hefu, South Marandellas.
J. Tones, Peddie, Marandellas.
J. J. Trent, Soft and Springfield, Macheke.
P. J. von Vollenstee, Magar, Macheke or Marandellas.
W. F. Versfeld, Surrey and Suffolk, Marandellas.
C. H. Walker, Sutton, Marandellas.
J. Walthew, Wye Valley, P.O. Inoro, Marandellas.
T. Watts, Allen, P.O. Macheke.
E. C. Webb, Eirene, P.O. Marandellas.
C. H. Wilmot, Schoongezicht, Marandellas.
R. H. Wood, Exeter, Macheke.
C. M. Wright, Shortlands and Loquat Grove, Mangwendi.
J. V. Williams, Showers, Macheke.

HARTLEY.

F. W. Adlam, Good Hope, Gadzema.
R. H. N. Ambrose, Hillside, Gatooma.
H. J. Ames, Ellerton, P.B. Salisbury.
J. Appleton, Railway Farm No. 30, Norton Siding.
J. W. Banner, Kanyemba and Venice, Umsweswe.
W. F. Baudinet, Combe and Netherburn, Gatooma.
S. H. Barkhuisen, Burgundy, Eiffel Flats, Gatooma.
J. Barrowman, Auchterleny, Duchess Hill.
J. B. C. Barwise, Wessels' Rust, Marshbrook.
W. H. Basson, Gorali, Beatrice Mine.
T. G. Baxter, Cupar and Stirling, P.O. Beatrice Mine.
G. Benade, Doune, Beatrice or Salisbury.
A. M. Bissett, Makwiro Source and Donnington, Makwiro.
C. R. Bradfield, Wantage Plot No. 1, Hartley.
H. J. Brits, Wetdoorn, Beatrice.

O. C. J. Britz, Deelvlei, P.O. Marshbrook.
A. J. Burrows, Burlea and Corleinor, Gadzema.
F. G. Champion, Blue Ranges, P.O. Box 41, Gatooma.
Campion Bros., Hope Farm, Eiffel Flats.
F. P. Carlisle, Oxford, Makwiro.
C. E. Charter, Mornington, Gatooma.
A. E. Cheales, Lincoln, P.B. Salisbury.
H. Crabtree, Tantallon, P.O. Box 215, Salisbury.
K. Cremer, Brunswick, Hartley.
W. M. Cumming, Rock and Camarie, Norton.
J. Cumming, Glenluce, P.O. Box 223, Salisbury.
G. H. W. Curle, Curlewood, Makwiro.
F. A. E. Curle, Risboro, Hartley.
W. J. Cutler, Chigwell and Chigwell Extension, Hartley.
A. Dale, Madgori, Norton Siding.
H. C. Dalton, Good Hope, Gadzema.
Dalton & Fitt, Cherry Bank and The Ranch, P.O. Box 1, Gatooma.
J. J. Dickson, Wyndicliffe and Duntocher, Makwiro.
A. Dingwell, Maple Leaf, Norton.
Dixon & McLeod, Cecil, P.O. Box 577, Salisbury.
Douglas Bros., Norwood, P.O. Tarn Estate, Old Hartley.
S. J. J. du Plessis, Voorspoed, Beatrice.
A. du Plooy, Eden, P.B. Enslindeel, Salisbury.
L. F. du Rand, Trome, Beatrice.
F. J. du Toit, Knowie and Austria, Norton.
G. T. Dyke, Bosbury, Hartley.
H. L. Edmonds, Sandringham, Dorton, Linden Park and Waedon, Norton Siding, Hartley.
H. P. Enslin, Enslindeel, P.B. Enslindeel, Salisbury.
H. Feldt, Dorothy Hill, Makwiro.
J. J. Felix, Cardigan, Umsweswe.
Fereday Bros., Zimbo Junction, P.O. Box 539, Salisbury.
G. N. Fleming, Gilston, Department of Agriculture, Salisbury.
H. Fletcher, Didcot and Cavan, P.O. Salisbury.
Fletcher & Co., Idaho, Norton.
A. B. Fraser, Pollockshields, P.O. Box 2, Gwelo.
R. H. Futter, Meadowlands and Stanhope, Makwiro.
H. Galloway, portion of Austria and Garvillan, Norton Siding.
P. Garizio, Kerry, P.O. Beatrice Mine.
W. N. Gebbie, Netherfields, Makwiro.
R. D. Gilchrist, Walden, Duchess Hill, Hartley.
C. Gordon, Philiphaugh, Makwiro.
W. L. Gray, Harlech, P.O. Salisbury.
A. Green, Exwich, Hartley.
W. Grieve, Suumcique, Arbroath, Brechin and Ardno, P.O. Box 238, Salisbury.
H. Grimmer, Serui Source, Norton.
C. Groun, Ranwick, Duchess Hill.
J. H. Hall, Edinburgh and Nyatsime, P.O. Box 252, Salisbury.
W. T. Hall, Elston, P.O. Box 189, Salisbury.
F. N. Hambly, Borden Extension, Duchess Hill, Hartley.
J. B. Hamilton, Shamrock, P.O. Box 60, Salisbury.
H. E. Hamshaw, Stoneygate, Duchess Hill.
Handrick & McCulloch, Ameva, Hartley.
J. Hannaford, Clifton, Hartley.
J. E. H. Hardy, Guildford, P.O. Beatrice Mine, Salisbury.
H. W. Harris, Carnock, P.B. Salisbury.
A. E. Hills, Plot No. 3 (adjoins Risboro), Hartley.

Hobbs & Tully, Denby, P.B. Salisbury.
A. Hodson, Gowerlands, P.B. Salisbury.
D. J. Hodgson, Grasmere, Norton.
D. C. Hoffmann, Nebo, Beatrice Mine.
A. Holmes, Homedale, Shamva.
J. Hookham, Cotswold, Makwiro.
C. J. S. Hopgood, Eyam, Mines Office, Bulawayo.
H. M. Howard, Carnock and Odar, P.B. Salisbury.
J. G. Hunt, Impofhoe, c/o W. H. Williamson, P.O. Box 288, Salisbury.
Hurst & Rolfe, Jenkinstown, Glenside and Braeside, P.B. Salisbury.
A. Hussey, Benga, P.O. Box 75, Gatooma.
T. Hussey, Orange Grove, P.O. Box 8, Gatooma.
J. C. Jameson, Lydiate, P.B. Lydiate Siding.
A. A. Jannasch, Elston Extension, c/o Jameson's P.B., Lydiate Siding.
E. Jessop, Normandy, Gatooma.
D. Jones, Bryn, Lydiate Siding.
C. W. Kanngieser, Walmer Park and Sabonabon, Gatooma.
Knight & Folkestad, Hippovale and Umvovo, Hartley.
G. W. V. Knight, Blagdon, Gatooma.
W. Krienke, Elvington and Greenlands, Beatrice.
J. W. Lawrence, Knockmaroon, Norton.
R. G. Lawson, Edendale (part of), Hartley.
M. G. Leahy, Lowood, Gadzema.
W. M. Leggate, Ardgowan, Gubnabor and Nyamuli, Duchess Hill.
E. A. Lester, Plot No. 2, Hartley, the Gaol, Hartley.
Lewen & Blank, Dawn, Duchess Hill.
J. Lucas, Scotsdale, Makwiro.
F. Luxat, Spring Creek, Gatooma.
J. Mack, Erin, Golden Valley, Gatooma.
C. S. Marks, Bedford and Bedford South, P.O. Box 76, Hartley.
W. Massie, Balmoral, P.O. Box 486, Salisbury.
A. Mathers, Bulfield, Makwiro.
P. H. McDonald, Georgina, Beatrice Mine.
Lieut. D. McLean, Evergreen, B.S.A.P., Salisbury.
McLellan & Smith, Cromdale, Makwiro.
A. W. Mellish, Imbgwa, P.B. Salisbury.
W. Mells, Marshlands, Norton.
A. Meston, Sunflower and Tilford, Norton.
J. J. Meyer, Mount Lavina, c/o H. P. Enslin, P.B. Enslindeel, Salisbury.
F. H. Naested, Nhuku and Borrowdale Plot, Salisbury.
C. Neale, Umfulia, Makwiro.
J. de L. Nimmo, Newmarch, Hartley.
E. Oxley, Elandsfontein and Preston, Norton.
Parker & Eldrid, Hillview, Tarn Estate, Makwiro.
P. W. Paskin, Dewaras, Shagari.
Pearson & Compton, Thorndyke, Makwiro.
C. S. A. Rawstone, Richmond, Battlefields.
J. G. Rhodes, Thurgarton, Hartley.
Rhodesia Lands, Ltd., Hunyani Estate, P.O. Box 94, Salisbury.
D. V. Souter-Robertson, Wortley, Norton.
D. Robertson, Ardmore, Makwiro.
Rogers & Ludgate, Lincoln and Lion Hill, Eiffel Flats.
J. J. Rohm, Friedenthal, Beatrice.
H. F. Rohm, Lang Glen, Beatrice.
H. B. Rutherford, Kent Estate, Norton.
T. W. Savory, Lambourne and Twyford, Hartley.
Schwartz & Springer, Rosebank, P.O. Old Hartley, Makwiro.
Chas. Sell, Daisy, Norton.

C. E. Simpson, Concession Hill and Laforte, Hartley.
P. Slements, Edendale (part of), P.O. Hartley.
Smethurst Bros., Lancaster, Alton and Halton, Norton.
A. S. Smith, Zimbo Drift, Makwiro.
D. Smith, M'Naku, P.B. Beatrice Road.
T. Smith, Compton, Gatooma.
W. L. Snell, Devon, Gatooma.
T. H. Stewart, Dartmoor, P.O. Box 373, Salisbury.
G. Stodart, Springvale and Marlow, Duchess Hill, Hartley.
N. St. Quinton, Exe. c/o C. Gordon, Makwiro.
G. H. Surtees, Woodsgift, Makwiro.
R. Sutherland, Weston, Eiffel Flats.
Sworder Bros., Hallingbury, Hartley.
D. N. Syme, Hopewell, P.O. Makwiro.
Mrs. G. Taylor, Luthrie, P.B. Salisbury.
R. W. Taylor, Hiltonia and Sunnymeade, Gatooma.
F. C. Taylor, Fernhurst, Gatooma.
Thompson, Sons & Proudfoot, Chevy Chase, Comrie, Thomean, Glen Lyon and Grantley, Shagari.
F. E. Thomson, Kenombo, Beatrice.
W. Thomson, Lanark, P.B. Salisbury.
C. E. Tulley, Maine, Birch Farm, Norton.
R. H. Ullyett, Mayflower and Acorn, Gatooma.
A. G. Varrall, Franceys, c/o Fletcher & Co., Idaho Farm, Norton.
H. von Memerty, Kujarvy, Makwiro.
M. L. von Rensburg, Geluk, P.O. Marshbrook.
C. D. Voigt, Garthnor, Makwiro.
J. Warwick, Martin, Eiffel Flats.
Mrs. A. E. Watkinson, Stanley and Dorithmore, Hartley.
M. S. Webb, Nengwe and Beatrice, Beatrice.
T. Wheeler, Wheelerdale, Enkeldoorn.
C. H. Wheildon, Chadshunt and Chadshunt Extension, Shagari.
E. S. White, Harringay, Makwiro.
D. Williams, Kimcote, Veterinary Department, Salisbury.
P. W. Wintle, Chingford and Serui, Makwiro.
G. C. Woodforde, Lanteglos and Lanteglos East and Just Right, Eiffel Flats.
G. Wrench, Tankatara, Norton.

SALISBURY.

S. N. Arnott, Good Hope, P.O. Box 341, Salisbury.
W. J. Atherstone, Plot 19, Mount Pleasant, P.O. Box 374, Salisbury.
H. O. Backhouse, Oldbury and Calgary, P.O. Box 27, Salisbury.
M. E. Bain, Henricksen, P.O. Box 347, Salisbury.
W. B. Bartlett, Thornpark and Zizalisari Plot 5, P.O. Box 548, Salisbury.
B. Bernstein, Bluewater and Chitara, P.O. Box 340, Salisbury.
J. G. M. Bernard, Borderland and Witness, Goromonzi, Arcturus.
D. Black, Selby, P.B. Salisbury.
W. J. Black, Warren, P.O. Box 562, Salisbury.
L. Black, Stapleford and Glenlussa and St. Marnock's, Salisbury.
J. Blatherwick, Highfield and Commonage, B.S.A.P. Camp, Salisbury.
W. Bovill, Glenavon, P.B. Salisbury.
A. H. Brown, Arlington Estate, Adair, Bontelle, Bunker's Hill, Everton, Eyrecourt and Iddesleigh, P.O. Box 135, Salisbury.
H. Browning, Tynwald, Salisbury.
C. F. Browning, Mabelreign, Park Ridge, Whitecliffe and Avondale, c/o Meikle Bros., Salisbury.
R. Butchart, Homefield, P.O. Box 313, Salisbury.

G. M. Byrne, Byrne View, Arcturus.
J. Burnett, Dovedale, P.B. Dovedale, Salisbury.
G. C. Campbell, Upton, P.B. Bromley Siding.
H. B. Christian, Ewanrigg, Arcturus.
H. H. D. Christian, The Meadows, Arcturus.
J. Clark, Fontainebleau, P.O. Box 579, Salisbury.
Mrs. Clayton, Hatcliffe, P.O. Box 44, Salisbury.
Rev. Mother Prioress, Convent S.D., Emerald Hill, P.O. Box 101, Salisbury.
J. A. Cuthbert, Cuthbert's, P.O. Box 264, Salisbury.
Mrs. A. Deary, Brookmead and Wychwood, Salisbury.
J. L. de Jager, Bluff Hill, Salisbury.
J. D. Den, Sunnyside, c/o A. R. Lilford's P.B., Salisbury.
M. Den, Doornfontein and part Sunnyside, P.O. Box 510, Salisbury.
J. Dennis, Pendennis and Lots 33, 36 and 3, Mount Pleasant, P.O. Box 424, Salisbury.
H. R. de Noon, Arundel, P.O. Box 262, Salisbury.
B. G. Derry, Stoneridge and Longlands, P.O. Box 6, Salisbury.
P. F. Derry, Avondale Plot 37a, P.O. Box 10, Salisbury.
Dixon & McLeod, Dyrham, P.O. Box 577, Salisbury.
J. A. Dracatos, Wellesley, Wellesley Halt, Salisbury.
Draper & Jenkins, Hillside, P.B. Bromley, Salisbury.
H. J. du Preez, Nalire, P.B. Salisbury.
N. W. Eastwood, Sigaro, P.B. Salisbury.
A. Ekblad, Kilworth, P.O. Box 136, Salisbury.
J. C. Elsworth, Chikurubi, P.O. Box 415, Salisbury.
Fynn & Fleming, Plot on Salisbury Commonage, Department of Agriculture, Salisbury.
A. T. Forrest, Arden, P.B. Salisbury.
H. C. K. Fynn, Avondale Government Reserve, Treasury, Salisbury.
J. Gallagher, M.T.C., Salisbury.
L. Glanfield, Ballineety and Lily, Salisbury.
J. Grant, Gilnochie and Arcturus, Arcturus.
W. T. Grantham, Penrose, P.O. Nyabira, *via* Salisbury.
S. H. Green, Willowvale, P.O. Box 287, Salisbury.
P. H. Gresson, Sebastopol and Galway Estate, P.B. Salisbury.
R. Haddow, Avondale, P.O. Box 129, Salisbury.
J. H. Hampton, Gwebi Experiment Farm, P.B. Salisbury.
E. Hardcastle, Inkomo, Borrowdale and Langford, Poste Restante, Salisbury.
C. G. Hards, Somerby and Stonehurst, P.O. Box 491, Salisbury.
H. C. Hards, Saffron Walden, P.O. Box 491, Salisbury.
C. A. K. Harvey, Melfort Estate, P.B. Salisbury.
G. Haupt, Greendale & Goromonzi, P.O. Box 77, Salisbury.
C. Heanly, Vainona, P.O. Box 169, Salisbury.
Rev. Hesse, Chishawasha, P.O. Box 54, Salisbury.
Mrs. I. Hodgson, Amby, Salisbury.
E. E. Homan, Colga and Craig, P.O. Box 80, Salisbury.
J. P. Horsfield, Heany, P.O. Box 215, Salisbury.
Jackson & McKeown, Aberdeen, Salisbury.
G. H. James, Willowvale, P.O. Box 505, Salisbury.
J. H. Jamieson, Fishponds and Sternblick, P.B. Salisbury.
Jarvis & Shortt, Hopley, Salisbury.
J. Johnstone, Oribi, Stockholm, Arcturus.
J. P. Jooste, Randhurst Grange and Arcadia, P.B. Salisbury.
H. C. King, St. Marnock's, P.B. Stapleford Siding, near Salisbury.
H. Kirkman, Lowlands and Stamford, P.O. Box 311, Salisbury.
W. H. Laidlaw & Son, Kinvarra, P.B. Salisbury.

J. D. Lamb, Strathmore (Zizalisari Lots 10, 11, 12 and 13). P.O. Box 129, Salisbury.
G. Lamb, Eskbank, P.O. Box 129, Salisbury.
A. R. Liddle, Odar, P.O. Box 232, Salisbury.
H. E. Light, Lochinvar, P.O. Box 287, Salisbury.
A. R. Lilford, Lilfordia, P.B. Salisbury.
W. H. Ling, Avondale Plot 47, Block "B," P.O. Box 535, Salisbury.
B. Liss, Dry Killiemore, P.B. 35 m.p., Lomagundi Railway.
J. Logan, The Rest and Amalinda, P.O. Box 302, Salisbury.
Rev. J. H. Loveless, Epworth, Glenwood and Adelaide, P.O. Box 285, Salisbury.
C. C. Macarthur, Komani and part of Glenara, P.O. Box 284, Salisbury.
J. W. McBeath, Avondale Plot, P.O. Box 125, Salisbury.
R. Macbeth, Forres, P.O. Bluewater, Salisbury.
Macfadzean Bros., Gletwyn, P.O. Box 436, Salisbury.
Mrs. H. Mackendrick, Zizalisari Lot 4, P.O. Box 434, Salisbury.
F. C. Maritz, Saturday Retreat, c/o Argus Co., Salisbury.
Wm. McChlery, Hillside Plots R 1 and E 16 and 17, P.O. Box 550, Salisbury.
J. McChlery, M.L.C., Gillingham, Hendon and Cheriton, P.O. Box 233, Salisbury.
McChlery & Templeton, Rainham, P.O. Box 555, Salisbury.
McChlery & Templeton, Killiemore, P.O. Nyabira, *via* Salisbury.
R. McIlwaine, Donnybrook and Orange Grove, Law Department, Salisbury.
J. McLauchlan, Pomona, P.O. Box 227, Salisbury.
G. H. Mellor, Vuta, Arcturus.
J. T. Millar, Avondale and Commonage, P.O. Box 537, Salisbury.
Municipality, Municipal Sanitary Farm, Town House, Salisbury.
H. C. M. Nangle, Teviotdale, P.O. Box 306, Salisbury.
Mrs. S. S. Nesbitt, Baine's Hope, Goromonzi.
W. F. Newman, Mount Hampden, Selby, P.B. Salisbury.
T. H. Newmarch, Glenara and Bendaugh, P.O. Box 287, Salisbury.
H. Nicodemi, Chinyika, Arcturus.
E. A. Norton, Mayfair, c/o P. H. Gresson, P.B. Salisbury.
J. W. Palmer, Thornpark and Zizalisari Outspan Plot No. 5, P.O. Box 548, Salisbury.
C. F. Paper, Lonely Park, Arcturus.
Father E. Parry, S.J., Hartmann Hill, P.O. Box 54, Salisbury.
J. Pascoe, Crowborough, P.O. Box 263, Salisbury.
A. R. Peacocke, Learig, P.B. Salisbury.
E. F. Peacocke, Mashona Vlei and Mashona Kop, Learig P.B., Salisbury.
P. Peech, Rumbavu Park, P.O. Box 199, Salisbury.
R. Philip, Ivordale, Arcturus.
J. F. Pilgrim, The Springs, P.O. Box 576, Salisbury.
L. H. Rascher, Sodbury, P.B. Salisbury.
H. D. Rawson, Alderley and Grazeley, Arcturus.
P. Reimer, Stuhm and Devonia, P.O. Box 291, Salisbury.
Rhodesia Lands, Ltd., Borrowdale, P.O. Box 94, Salisbury.
J. Richardson, Woodford, Arcturus.
J. Ross, Cromlet and half share Amritsur, c/o J. Watson, Arcturus.
J. A. Rudolph, Rudolphia, Arcturus.
J. F. Rudolph, Guernsey, Arcturus.
Sadler & Creswell, Charfield and Downend, c/o C. B. Winder, Wellesley P.B., Salisbury.
F. Sheppard, Waterfall Poultry Farm and Uplands, P.O. Box 358, Salisbury.
Mrs. A. D. Shirley, Manor Farm, Bromley.
E. V. Shirley, Mount Pleasant, P.O. Box 95, Salisbury.

W. M. Simpson, The Grange, Salisbury.
J. M. Sinclair, Glen Norah, P.O. Box 257, Salisbury.
E. H. South, Sublime and Warwickshire and United, P.B. Hunyani, Salisbury.
A. G. Staunton, The Grove, P.O. Box 575, Salisbury.
Dr. Stewart, Twentydales and Deansbrook, P.O. Box 88, Salisbury.
Steel & Rigali, Whiteside, P.B. Bromley Siding.
A. Stidolph, Mount Pleasant Plots 20, 21, 22, 30 and 47, P.O. Box 374, Salisbury.
F. A. Strobel, Derbyshire and Waterfall, P.O. Box 63, Salisbury.
H. J. Templer, Dispute, Ruwa Siding, Salisbury.
Templeton Bros., Derry, P.B. Salisbury.
Topper & Co., Green Grove, P.O. Box 489, Salisbury.
G. V. van der Bijl, Welmoed, P.O. Box 145, Salisbury.
L. S. A. Vereker, Carrickcreagh and Helenvale, P.O. Box 94, Salisbury.
H. & K. von Memerty, Mashonganyika, Goromonzi.
Mrs. A. S. Waller, Sunnyside, Nyabira Siding, Salisbury.
J. M. Warden, Lawfield, Arcturus.
F. Warner, Haydon, P.B. Mount Hampden.
Alice L. Warton, Gardner, P.O. Arcturus.
D. Watson, Drymie, c/o J. Watson, Arcturus.
J. Watson, Kilmuir and half share Amritsur, P.O. Arcturus.
Watson & Ross, Amritsur, c/o J. Watson, Arcturus.
D. Webb, Prospect, P.O. Box 314, Salisbury.
A. V. Williams, Lorelei, Makabusi and Green Grove "A," P.O. Box 255, Salisbury.
C. B. Williamson, Glen Lorne, P.O. Box 26, Salisbury.
C. J. J. Wilke, Doynton, P.O. Umsururu.
F. B. Willoughby, Government Forest Nursery, Salisbury.
E. Wilson, Lyndhurst, Porta and Riverside, P.B. Salisbury.
C. B. Winder, Wellesley, Cardiff and Oldland, P.B. Salisbury.
R. B. Wood, Greystone, P.O. Box 120, Salisbury.
W. J. Woods, Colne Valley, P.O. Box 293, Salisbury.

LOMAGUNDI.

W. Abbott, Baguta, P.O. Eldorado.
F. Adamson, Freda, Sinoia.
A. E. Aukett, Baruka, c/o A. H. Layard, P.O. Sinoia.
A. G. Babbage, Dichwe, Sinoia.
Bateman & Nasan, Sinoia Drift, Sinoia.
W. A. Beattie, Dunphaile, Banket Junction.
E. Behrndt, Chezui, Sinoia.
E. J. Bekker, North Banket, Banket Junction.
A. A. Bissett, Maningwa, P.O. Sinoia.
J. Black, Argyle, P.O. Golden Kopje.
E. C. J. Brown, Mvebi, Gwebi Siding.
Mrs. R. Clarkson, Anderton and Duxbury, P.O. Sinoia.
S. A. S. Colborne, Lone Cow Estate, Weston Park and York, Banket Junction.
Currie & Wallace, Shubare and Tsara, P.O. Sinoia.
B. de Filippe, Olive and Kingswood, P.B. 35 mile peg, Lomagundi Railway.
— Dimmock, Virginia, P.B. Salisbury.
K. Dingwall, Riverside, Eldorado.
T. J. du Plessis, Springfield, P.O. Eldorado.
S. Edwards, Rivington and Two Tree Hill, P.O. Sinoia.
F. Eldrid, Long Valley, P.O. Sinoia
G. H. Ford, Fupi, Sinoia.
G. Galloway, Marshlands, Eldorado.

A. Garrard, Brundish, Sinoia.
E. B. Goldsworthy, Mfuti and Msasa, P.O. Box 379, Salisbury.
C. H. Gordon, Kashao, Banket Junction.
J. M. Gordon, Myaroro, Wari and Mangamba, P.O. Sinoia.
M. A. Graham, Chaosina and Dalston, Banket Junction.
J. Gubbin, Sangue, c/o S. R. Garrard, Sinoia.
H. A. Hambling, The Warren, c/o H. Drayton, P.O. Sinoia.
F. S. Harris, Highbury, Sinoia.
G. J. Harter, Two Tree Hill, P.O. Sinoia.
T. Harvey, Haltondale, Riveria and Urungwe, Sinoia.
J. Hay, Kanami, P.O. Golden Kopje.
Col. H. S. Hazelgrove, Inyati, P.O. Sinoia.
J. Herrington, Bome, Sipolilo, *via* Sinoia.
Dr. W. M. Hewetson, Umzari, Sinoia.
C. N. Higgs, Lion's Den, Sinoia.
S. W. Hinze, Mukwe River Ranch, Sinoia.
A. Hockley, Kasoko and Gamanya, Golden Kopje.
H. L. A. Houblon, Devonia, Sinoia.
C. H. Howell, Mcherengi, Sinoia.
Inge Bros., Zebra Vlei and Layton, Umboe.
H. A. Jacobson, Haydock Park, Gwina and Plumstead, Banket Junction.
R. Jeffrey, Msengi, Eldorado.
Capt. W. S. Kearns, Whindale, Sinoia.
P. W. Kidwell, Braeside and M'hondoro, Eldorado.
E. R. Kirkwood, Tchetchenini, P.O. Sinoia.
J. P. Kirstein, Munwa, Sinoia.
H. Kneiser, Nyapi and Ayrshire, P.O. Eldorado.
W. F. Knight, Mayfort, Eldorado.
Larter Bros. and Peake & Larter, Bessville Grange and Dunphaile, P.O. Eldorado.
B. Lascelles, Msina, Sinoia.
A. H. Layard, Mupata, P.O. Sinoia.
R. A. Leask, Nassau Estate, P.O. Sinoia.
C. J. Letts, Biri, P.O. Sinoia.
H. Lovemore, Golden Kopje, Golden Kopje.
H. W. Markham, Oswa and Muni, Sinoia.
R. Mathews, Newlands and Newlands Extension, Eldorado.
N. Mathews, Wannock Glen, Eldorado.
E. F. Mayne, Bandira, Golden Kopje.
C. J. McDonald (Manager), West Ranch, Sinoia.
J. McChlery, Wigtown and Kia Ora, Banket Junction.
A. Martin, Mount Jetchenini, Sinoia.
P. H. McDonald, Hillrise, Sinoia.
J. McMurdon, Glen Clova, P.O. Golden Kopje.
Mrs. G. Campbell, Gomo, c/o H. Milton, Banket Junction.
C. N. Higgs (Manager), Umboe, Lion's Den, Sinoia.
C. Mortimer (Manager), Gorodema and Puri, P.O. Golden Kopje.
A. Muir, Dingley Dell, Sinoia.
E. J. Murray, Romsey, Sinoia.
D. C. Norval, Bon Accord, P.O. Sinoia.
H. Norval & Son, Retreat, Golden Kopje.
G. G. Oliver, Doornplaats, Sinoia.
R. Oliver, St. Ives, Sinoia.
A. Peake, Umvukwe Ranch, Banket Junction.
S. G. Peall, Portelet, Golden Kopje.
E. N. Plevins, Shubare, c/o W. E. Gower, P.O. Sinoia.
W. Powley, Sholliver and Mowe Flats, Banket Junction.
C. S. Pratt, Mukori, P.O. Golden Kopje.

Mrs. E. Rausch, Liston Shields, Golden Kopje.
Mrs. J. A. Rautenbach, Koodoo Hill, Banket Junction.
J. J. Reynard, Reynardia, P.O. Gadzema.
Rhodesia Ranching Co., Darwendale and Donington, P.B. Salisbury.
D. Richards, Chifundi, P.O. Sinoia.
H. A. Richards, Mtsou, Montgomery Estate, Eldorado.
A. Roberts, Panmure Pits, Eldorado.
W. Robertson, Cotswold, P.O. Sinoia.
Sadler & Creswell, Sutton Estates, c/o C. B. Winder, Wellesley P.B., Salisbury.
H. F. Schultz, Mutala, P.O. Sinoia.
Schultz & Tilley, Nyamakari, P.O. Sinoia.
Mrs. D. Schultz, Ingonya, Sinoia.
F. Scott, Olympus, P.O. Sinoia.
L. Selman, Kisanzi, P.O. Banket Junction.
F. R. Sheasby, Riversdale, Sinoia.
A. Smith, The Wold, Urundi and Shankuru, Banket Junction.
S. V. E. Smuts, Campagna, Deerhurst and Valdesia, Sinoia.
N. Smyth, Sinoia Estate, Sinoia.
Mrs. A. Steel, The Wichens, Eldorado.
A. M. Stenhouse, Shackelton, Sinoia.
J. S. Struthers, Palm Tree, Sinoia.
Templeton Bros., Glenluce, Eldorado.
J. L. Thompson, Nyamatuva, P.O. Sinoia.
Capt. Tronsdale, Longmeade, c/o H. Drayton, Sinoia.
F. R. Underwood, Nyatandi, Umboe.
F. von Herford, M'pandaguta, Banket Junction.
J. T. van Heerden, Angwa Syndicate, Laureton and Ormeston, P.O. Sinoia.
C. Waller, Eviedale, Reynard Cottages, Salisbury.
Williamson & Pollock, Manengas, Sinoia.
C. F. Wilmot and E. Windle, Baramanya and Hillside, P.O. Golden Kopje.

MAZOE.

G. E. Adamson, Melfort Rapids and part of Selwood and Baraisse, Melfort, Bindura.
W. P. Alexander, Woodlands, P.B. Shamva.
J. S. Anderson, Coryton, Shamva.
J. Appleby, Bloomfield, Benridge, Glendale.
J. Appleby, jnr., Chelvey, Glendale.
Dr. Appleyard, Villa Franca, P.O. Glendale.
Ashton & Bergin, The Ridge, Bindura.
G. J. Austen, Benwell and Benwell Extension, P.B. Salisbury.
F. A. Badenhorst, Vergenoeg, Bindura.
H. Badenhorst, Glencairn, Bindura.
D. W. Bean, Maxton, P.O. Shamva.
A. C. W. Berry, Grey, Glendale.
W. J. Biggs, Bellevue, P.B. Salisbury.
D. Black, M'Guta, P.B. Salisbury.
J. J. Black, Estes Park, M'Guta and Fairview, P.B. Salisbury.
H. J. Blackburn, Bindura Plot, portion Dandazi, P.O. Bindura.
J. Bonsor, Bonny and part of Arcadia, Kimberley Mine, Bindura.
H. K. Bracewell, Ruia Estate, P.B. Salisbury.
A. Campbell, Mayfield and Fairview, Selby, P.B. Salisbury.
P. G. Case, Richlands South and part of Chipoli, Shamva.
— Chamberlain, New Brixton, Shamva.
M. D. Claxton, Mumwi, Mont d'Or Mine, Shamva.

A. Cobban, Bindura Plot 2, Bindura.
Mrs. D. Cockburn, Makori, Glendale.
W. B. Colling, Ruorka Ranch and Esperanza and Galloway, P.B. Salisbury.
W. G. Cook, Willesden, P.O. Box 19, Salisbury.
Davis Bros., Irenedale, Glendale.
J. E. Dawson, The Spa, P.B. Salisbury.
O. H. de Beer, Cairo, c/o G. A. Dobbin, P.B. Salisbury.
T. S. B. Dick-Cleland, Wolley and Panmure, Shamva.
G. A. Dobbin, Omeath, P.B. Salisbury.
W. H. Dodd, Clifton, Glendale.
A. J. Doyle, Georgia, Glendale.
J. W. Drakes, Laurencedale, Glendale.
J. W. Dunlop, Patterson and Carse, P.B. Salisbury.
F. C. du Plooy, Mount Glendale, Mazoe.
J. G. du Preez, Verona, Glendale.
G. Duthie, Devondale, P.B. Salisbury.
M. Edgar, Richlands, Shamva.
D. Evans, Cadogan, Shamva.
Mrs. F. Eyles, Umsasa, Mazoe.
J. H. Farmer, Malvern, Bindura.
J. J. Farrar, Zombi, Shamva.
R. Fletcher (Manager), Cardiff, Bindura.
— Freestone (Manager), Insingisi, P.O. Box 2, Bindura.
R. C. Frith, Bamboo Creek, Shamva.
M. D. Fynn, Rydal, P.B. Passaford, P.O. Salisbury.
V. W. Fynn, Excelsior, c/o H. H. Marriott's P.B., Salisbury.
R. G. Garvin, Virginia, Sleamish and Virginia Extension, P.B. Salisbury.
J. O. Gibson, The Berea, Salisbury.
Gibson & Peacy, Brock Park, P.B. Passaford.
C. J. Glen, Kippendale, Bindura.
Graham Bros., Avilion, The Bend and Maizenze, Shamva.
P. Gouws, Wild Dog Valley, Bindura.
R. L. Gray, Foyle, includes Ibima, Mpinigwe, Bernheim, Tjibakwe and Igami, P.O. Jumbo Mine.
O. A. Hagelthorne, Hereford, c/o Standard Bank, Bindura.
Harrison & Drabble, Walwyn and Nolton, Shamva.
E. Hartley, Argyle Park and Felton, P.O. Box 11, Bindura.
H. Hastings, Robin Hood, Shamva.
K. B. Haybittel, Sussex, P.B. Salisbury.
W. B. Hazelhurst, Claverhill, c/o A. W. Rose, Bindura.
A. G. Hefer, Geluk, c/o H. L. Rainer's P.B., Salisbury.
A. C. Henderson, Great "B," c/o Salvation Army P.B., Salisbury.
C. J. Hoffman, half share Fochabers, c/o H. H. Marriott's P.B., Salisbury.
E. E. Homan, Dandazi, P.O. Box 80, Salisbury.
D. P. Hunter, Glen Douglas, Bindura.
T. Huxham, Spitzkop and Dimitra, Mazoe.
O. E. Jackson, Tipperary, Mazoe.
J. B. Kelly, Kendal, Shamva.
S. P. Light, Lucknow, Glendale.
P. Lindsay, N'diri and Manangas, Mazoe.
L. L. Lloyd, Hildadale, Arcadia and Maizelands, Bindura.
R. F. Marillier, Somerset and Summerdale, Jumbo.
R. H. Markham, Jesmond Deane, Bindura.
H. H. Marriott, Fochabers and Mavarradonna, P.B. Salisbury.
D. M. Martin, Ballyhooly, Glendale.
Mazoe Citrus Estate, Smithfield, The Willows and Brundret, Mazoe.
R. A. Mathews, Welston, Oaklands and Sussexdale, P.O. Box 569, Salisbury.

A. G. McCall, Craigengower, Glendale.
R. H. McDiarmid, Whitfield, Southmoor and Manyewe, c/o E. Salter, P.B. Salisbury.
Dr. McDonnell, Avoca, Bindura.
Mrs. E. McGillivray, Dunmaglas, Glendale.
D. McKay, Kilmer, P.O. Glendale.
McKersie & McCall, Lagnaha and Dunaverty, Bindura.
J. McLeod, Ingleborough, P.O. Box 160, Salisbury.
Meikle Bros., Granite, P.B. Salisbury.
A. C. Mills, Sangere and Greenhill, Bindura.
D. M. Mitchell, Villadale, Jumbo.
W. J. Morgan, M.E.D. Reserve, Monmouth House, Shamva.
A. R. Morkel, Ceres, Shamva.
Mossop Bros., Protea, Glendale.
J. M. Moubray, Chipoli, Dillon, part Ellerslie and Murgwi, and Highlands, Shamva.
A. Musson, Wengi River Estate, P.B. Salisbury.
D. H. Newett, Glen Divis, P.B. Salisbury.
R. S. Newett, Avonduur, P.B. Salisbury.
F. J. Newton, Pimento Park, Erin, Wiseacre and Caledon, Treasury, Salisbury.
Noaks & Yeoman, Limbeck, Glendale.
P. Norval, Arcadia, Bindura.
J. B. Owen, Springvale, c/o H. R. Palmer, P.B. Passaford.
J. A. Page, Impingi, c/o G. A. Dobbin, Omeath, P.B. Salisbury.
H. R. Palmer, Passaford, P.B. Passaford.
F. C. Peek, Teign, Glendale.
W. L. Plew, Glendale No. 4 and Umzi, P.O. Glendale.
W. R. Pottinger & Co., Ascot Vale, P.O. Box 431, Salisbury.
H. Prinsloo, Dundry, Glendale.
P. H. Rigg, Inyatzi and Volymia, P.B. Salisbury, Wolf Hill Siding.
W. B. S. Powell, Usk and Kasipi, Glendale.
P. J. Rademan, The Retreat, P.O. Bindura.
H. L. Rainer, Wolf Hill and Dunkerry, P.B. Salisbury.
G. Rattray, Kingston, P.O. Box 2, Bindura.
J. A. Reoch, Estes Park, P.B. Salisbury.
Rhodesia Lands, Ltd., Belford Estate and Howick Estate and Barwick Estate, Salisbury.
D. S. Riley, Selwood and Riverbend, Bindura.
J. Seton-Rogers, Wapley and Tipperary, Shamva.
A. R. Rutherford, Rutherdale, Shamva.
E. Salter, Rockwood, Amandas, Culmstock, Ledbury, part Southmoor, P.B. Salisbury.
Salvation Army (J. Thompson), Welbeck and Pearson, c/o Salvation Army P.B., Salisbury.
E. T. Saunders, Normandale, P.O. Jumbo.
F. W. L. Saunders, Nomansland, Bindura.
A. D. Scanlen, Pote, Salisbury.
A. W. Schafer (for Meikle Bros.), Whitecliffe, P.O. Glendale.
A. W. Schafer, Ellendale, P.O. Glendale.
F. Schreiber, Rocky Spruit, Glendale.
E. Scott, N'diri, Wormwood and Thorncreek, N'diri, P.B. Salisbury.
W. Scott, Oaksey, Shamva.
W. M. Sladdin, Collingwood, P.B. Salisbury.
H. E. Smith (H. S. Whaley, Manager), Burnleigh (part), Tafuna.
Mrs. A. P. B. Smith, Glenlea and Madzegutu, Selby Siding.
W. F. Snook, Cornucopia (upper), Mazoe.
Chas. Southey, Sunnyside and Punchustown, Jumbo.

J. H. Southey, Somerville, P.B. Abercorn Hotel, Tafuna.
G. Spencer, Duiker Flats, Bindura.
J. Strachan, Yarrowdale and Whitfield, Mazoe.
C. E. Strickland, Lion's Den, Shamva.
A. F. K. Taylor, Portlock, Mazoe.
T. Taylor, Ilton, Shamva.
M. Thal, Poorte View and Tatagura and Tatagura Extension, Mazoe.
Templeton Bros., Sandhurst, P.B. Derry, Salisbury.
E. A. Thompson, Carrier's Rest, c/o Thompson and Standis, Shamva.
H. A. Thorne, Middleton, Bindura.
W. E. Thurlow, Atherstone and Wild Dog Valley, Bindura.
C. C. Townsend, Lowdale, P.O. Box 234, Salisbury.
H. C. Tremlett, Lower Collingwood, Concession Siding.
-- Trusson, Carlisle, Bindura.
Mrs. J. Urry, Cornucopia, P.O. Glendale Station.
P. J. Viljoen, Rosetta Rust, P.O. Bindura.
C. F. von Levetzow, M'bebi, P.O. Mazoe.
A. & J. Waddell, Burley Bottom, P.O. Jumbo.
Chas. Waddell, Glenburn, P.O. Jumbo.
James Waddell, Pentland, Jumbo.
John Waddell, Stanley Kop, Jumbo.
A. Waddell, Ledbury, Bindura.
G. Warburton, Chipoli W. 2, P.O. Shamva.
Ward & Hofmeyr, Woodbrook, P.O. Bindura.
W. H. Watson, Hinton and Hillymead, P.O. Glendale.
J. B. Waugh, Moorfields, 44 Glendale.
F. J. Wells, Bellevue, Passaford P.B., Salisbury.
W. E. Wiggill, Bell Rock, P.O. Glendale.
J. Winter, Barassie, Bindura.
E. F. Witts, Leopard's Vlei, P.B. Salisbury.
Chas. Wood, Burnleigh, Shamva.
W. J. Woods, Mondynes and Brotherton, P.O. Box 293, Salisbury.
R. Wrightson, Chibara, Glendale.
O. Young, Seddies and Gosforth, P.B. Salisbury.
P. Zaffere, Christon Bank, St. Gerera, Spelonken and Balkisa, Alpes Mine, Mazoe.
I. M. Zietsman, Bitton, 25 mile peg, Lomagundi Railway.

DARWIN.

Chris Byerley, Vuma and Arcadia, P.O. Chin Mine, Mount Darwin.
W. B. Colling, Galloway, P.B. Salisbury.
J. W. Giles (Manager), Ravine and Molesy, Mount Darwin.
L. W. Southey, Fura and Thebus, P.B. Bindura.
S. L. Whiteford, Thornhill, c/o J. Fisher, Mount Darwin.

MREWA.

C. L. P. Attwell, Nyasikatzi, P.O. Macheke.
J. Cheyne, Hornsey, Macheke.
F. W. Church, Bimi, P.O. Macheke.
A. W. Crawley, Dawn, Macheke.
W. C. de Jager, Athlona, Macheke.
D. T. de Villiers, Koodoo Range, Macheke.
Draper & Kelly, Murrayfield, Macheke.
W. Edwards, Glennoe, Mrewa.
A. R. Jelliman, Jelliman's Rest, Solid and Despair, Macheke.
E. Lloyd-Levy, Rumambi, P.B. Macheke.

E. McNulty, Selous Nek, B.S.A. Co. Farm, Macheke.
S. J. Penny, Caskieben, Macheke.
E. R. Plant, Mignon, P.B. Macheke.
Tobacco Company of Rhodesia and South Africa, Ltd., Glen Somerset and Chigori, Macheke.
I. J. van Biljon, Alpha, Macheke.
H. H. Webber, Chizanza, Mug and Mount Pleasant, P.O. Macheke.
R. P. Webber, Warren, Macheke.

MTOKO.

W. P. Henderson, Nyakavusa, P.B. Macheke.
A. M. Hoffman, Mtoko, Mtoko.

MAKONI.

Allers & Nyblad, Inyagura, Rusape.
J. Alliott, Urmeston, c/o H. Barnes Pope, The Springs, Rusape.
F. Baddeley, Chiropa, Headlands.
Sir James Barr, Mparura and Maruma, c/o H. Shimmin, Headlands.
J. Bauer, Harrisonville, Rusape.
B. E. V. Bernard, Headlands and Edendale, Headlands.
M. H. Botha, Oliphant's Kop, Rusape.
A. Botha, Makoni South, P.O. Rusape.
H. H. O. Bridgeman, Achorashi, Odzi.
T. A. Brown, Ryesholm, Odzi.
J. Buchanan, Cross Roads, Bessie Mine, Old Umtali.
G. Bussy, Odzi Rapids, Odzi.
C. B. Clark, Castle Zonga and Whitethorns, Rusape.
W. Craig, Connaught, Headlands.
J. Cunningham, Ross-na-choich, Old Umtali.
Allan Curling, Dunholm, Inyazura Siding, P.B. Salisbury.
H. B. Curling, Ruati, Inyazura Siding.
R. W. Day, Forest Hill, Rusape.
G. J. Delport, Lovedale, Headlands.
I. A. Delport, Sandelboom and Thabor, Headlands.
H. M. Dewar, Chimbi Source, c/o F. J. Durand, Lesapi Peninsula, Rusape.
J. H. K. Doyle, Otago and Dunedin, P.O. Rusape.
F. J. Durand, Lesapi Peninsula, Rusape.
A. Durrheim (Manager), Lonekop, Headlands.
A. Ellingsen, Notgotimyet, Rusape.
J. R. Evans, Bloemhof, c/o G. J. Jordaan, Rusape.
E. K. Evans, Odzi Falls, Odzi.
R. le S. Fischer, Coldstream Ranch and Bornu, Headlands.
W. F. Fischer, Fischervale, Headlands.
H. A. Fitzpatrick, Lion's Head, Rusape.
W. A. Foord, Diana, Rusape.
J. Grewar, Yorkshire Estate, c/o Dr. Eaton, Bulawayo.
H. P. Grobler, Lekkerwater, P.O. Rusape.
P. S. Grobler, Invergall, Rusape.
S. H. Harnden, Silver Bow and Silverdale, Rusape.
Harvard & Harvard, Moria, Headlands.
Harvard & Ward, Nehumba, Headlands.
C. S. Heron, Eagle's Nest, Headlands.
A. Hislop, Makoni Kop, Rusape.
A. F. Innes, Fairfield Estate, Headlands.
J. Burton Jewell, Tsungwesi Ridge, Tsungwesi Mission, Inyazura Siding.
J. C. Johnson, Glen Spey and Oakvale, P.B. Rusape.
A. H. Johnstone, Lemoenfontein, Rusape.

P. B. Keyter, Sandelboom, Headlands.
J. J. Kotze, Helenvale, Headlands.
J. Kruger, Harewood, Inyanga.
G. Kruger, Makoni and Lekkerwater, P.O. Rusape.
F. Lapham, Cornucopia, Rusape.
F. W. Lapham, Maringowe, Headlands.
W. Layton, Nyamangura, Headlands.
L. F. E. Leslie, Game Valley, c/o J. L. Stokes, Old Umtali.
P. A. Linder, Inyamasitza, Rusape.
Rev. E. Lloyd, St. Faith's Mission, Rusape.
L. Lloyd, Gorubi Springs, Inyazura Siding.
C. L. Lyle, Kirkly Vale, Woodlands, Emerald and Maidstone, Rusape.
R. C. Maclagan, Chitora, Rusape.
T. D. Maclean, Braidwood, Odzi.
H. A. Marshall, Lesapi Valley, Rusape.
A. McPhun, Fernicarry and half of Craigendoran, Odzi.
N. J. T. Meyer, Inyamasinga, Headlands.
J. B. Michell, M'bobo Flat, part of Prospect, Rusape.
H. C. Michell, Lesapi Cave, Rusape.
Geo. Mitchell, Craigendoran, P.O. Odzi.
W. A. Mornberg, Prospect, Rusape.
A. C. Munch, De Vos and Mona, Rusape.
H. S. Nel, Barfeston, Inyazura Siding, P.B. Salisbury.
D. M. Niven, Blairmairn, Odzi.
E. M. Petreas, Chiduku Reserve, P.O. Box 8, Umtali.
H. Barnes Pope, The Springs, Rusape.
E. W. Pope, The Willows, Rusape.
B. J. E. Pretorius, Onzerust, Headlands.
G. J. J. Pretorius, Upper Lesapi Drift, Rusape.
L. Rautenbach, Barrydale, Inyanga.
H. S. Rugg, Everton and Inyazura, P.B. Inyazura Siding.
M. H. Shimmin, Bronzino and Tynwald, Headlands.
M. N. J. Strijdom, Prospect, Rusape.
J. A. Tapson, Duffryn, Rusape.
C. C. Tapson, Crofton, Rusape.
W. S. Tapson, Ripplemead, Rusape.
E. Taylor, Koodoo Kop, Headlands.
Rev. J. H. Upcher, Epiphany, Rusape.
S. Valentine, Transsau and Clare Estates, P.B. Salisbury.
J. C. van Breda, The Falls, Headlands.
A. J. van der Merwe, Fairview, Headlands.
M. P. J. van Rensburg, Magaragada, Rusape.
C. H. Walker, Mount Cheronga, Rusape.
Walker & Young, Zimati Kop and Rocking Stone, Rusape.
W. Woodward, Ellavale, Umtali.
Father B. Yackel, Monte Cassino, P.O. Macheke.
R. F. W. Ziehl, Recondite, Rusape.

INYANGA.

T. Connolly, Carlow, Inyanga.
F. P. de Meyer, Aberdeen, Inyanga.
M. A. Fleischer, St. Triashill, Rusape.
W. J. Hacking, York, P.B. Umtali.
N. McDonald, Juliasdale and Rupurara, c/o W. Hacking, P.B. Umtali.
J. McKenzie, Inyanga Valley, Rusape.
C. Marsh, Placefell and Rodel, P.B. Umtali.
J. W. Mienie, Sterkstroom, P.O. Inyanga.
H. C. Michell, Rhodes Inyanga Farms, Rusape.

D. Nowers, Rhino Valley, Inyanga, *via* Umtali.
C. J. Strijdom, Vlaknek, Inyanga.
J. van Aswegan, Mount Pleasant, Inyanga.
P. H. van Niekerk, Claremont, Inyanga, P.B. Umtali.

UMTALI.

American Mission (G. A. Roberts), Old Town and Woodlands and Nygambi, Old Umtali.
Col. O. Baker, Chiconga and Wrey's Drift and Odzi Drift, Old Umtali.
D. Barry, Alvi and Umtassa Ranch, P.O. Old Umtali.
Barry & English, Dora, Umtali.
J. T. L. Bekker, Odzani Junction and Theuni's Rust and Imbezu Plot, Penhalonga.
B. V. H. Blurton, Stralsund, Jerain, P.B. Umtali.
C. W. Blurton, Peacepool, Jerain, P.B. Umtali.
J. B. Bray, Fairholme, Christmas Pass, Umtali.
H. H. O. Bridgeman, Alderley, c/o J. L. Stokes, Old Umtali.
E. N. Carlton, Highlands, Administrator's Office, Salisbury.
Mrs. Cashel, Thaba Nchu, P.B. Umtali.
R. W. Cockerell, Matika's Kloof, Old Umtali.
L. Cripps, Fernhill and Cloudlands and The Park, Umtali.
F. Davis, Gloucester, Old Umtali.
W. H. Deall, Laverstock and Belford, Old Umtali.
J. R. Dessington, Mount Fair, Umtali.
R. H. B. Dickson, Hoboken, Umtali.
J. B. du Plessis, Butler North and South, P.O. Box 54, Umtali.
J. English, Umtali Commonage, Umtali.
J. T. English, The Ranch, Tarka, Tilbury, Newcastle, Mermaid's Grotto, Springfield, Smithfield, Freshfields and half Albany, Umtali.
C. Evans, Manchester, Umtali.
R. S. Fairbridge, Kingsley and Utopia, Old Umtali.
W. A. Grose, Essex, c/o Meikle Bros., Umtali.
— Gubb, Fern Valley, c/o L. Cripps, Umtali.
G. L. Harrington, Grange, Old Umtali.
R. Harvey, Argyle, Odzi.
J. Haslam, Brookville, Old Umtali.
J. L. Howie, Cairndhu Estate, P.O. Odzi.
W. Huhnel, Rhine, Umtali.
C. M. Hulley, Shigodora, P.O. Box 9, Umtali.
Mrs. R. H. Kimpton, Yardley and Imbezu Plot, P.O. Box 80, Umtali.
S. R. Leitch, Lisnacloon, P.O. Penkridge, *via* Umtali.
H. A. Louw, Imbezu Plots 5 and 7, Penhalonga.
Martin Bros., Banti North and South, Odzi.
A. Marton, Battery Spruit, Old Umtali.
D. McAdam, Walmer, Sheba, Odzani and Inyashuti, Penhalonga.
J. McCormick, Mount Wolseley, Old Umtali.
J. Meikle, Stapleford, P.O. Penhalonga.
J. Meikle, The "B," Penhalonga.
J. Norris, Devonshire, Umtali.
G. W. H. Ogilvie, Barrydale and Alphaston, Christmas Pass, Umtali.
O. Ogilvie, Imbezu Plot, Penhalonga.
J. Paisley, McAndrew, Mutambara Mission, P.B. Umtali.
J. A. Palmer, Greencroft, P.O. Box 49, Umtali.
T. M. Petrie, Fairview, Old Umtali.
G. Roberts, Athens and Jeram, Old Umtali Mission, Old Umtali.
H. Rutherford, Oliphant's Hoek, c/o J. L. Stokes, Old Umtali.

M. A. Rutherfoord, Whareiti and Scandinavia, Umtali.
W. Stokes, Weirmouth and Rahun, P.O. Box 125, Umtali.
J. L. Stokes, Kelly's Park and Buffalo Bush, Old Umtali.
A. Strickland, Inodzi and Savillen, Penhalonga.
W. H. Swain (Manager for B.S.A. Co.), Premier Estate and Imbezu Valley, Old Umtali.
A. R. Tulloch, Summerfield, Penhalonga.
E. M. Webber, Quagga's Hoek, Umtali.
J. H. Whitaker, Souldrop, Penhalonga.
M. W. White, Selborne, Penhalonga.
A. W. van Zijl (Manager for W. Wodehouse), Penkridge, Umtali.
G. M. Young, Durris, Penhalonga.

MELSETTER.

J. Ballantyne, Chipinga West, St. Kevin and Vleiplaats, Chipinga.
W. V. Bezuidenhout, Geluk, Chipinga.
P. R. Botha, Voorspoed, P.B. Melsetter.
P. J. Botha, Sanniesrust, Mount Selinda, Melsetter.
M. J. Bredenkamp, Uitkijk, Melsetter.
T. E. Brent, Eastleigh and Southdown, Helvetia, Melsetter.
W. D. Campbell, Randfontein, P.O. Chipinga, Melsetter.
P. J. Celliers, Haartebeestenek, Chipinga, Melsetter.
Mrs. W. C. Coetzee, Quagga's Hock, P.O. Penkridge.
Cooper & Hardy, Steijnstroom, North Melsetter.
C. J. Cronje, Schaapplaats, P.O. Chipinga, South Melsetter.
F. Cronwright, Jersey, P.O. Mount Selinda, Melsetter.
J. M. du Plessis, Zaaiplaats, Melsetter.
A. M. du Preez, Rookwood, Melsetter.
E. du Plessis, Clearwater, South Melsetter.
J. S. Ferreira, Mayfield, Helvetia, South Melsetter.
T. J. Ferreira, Bloemhof, Melsetter.
C. C. Fuller, Chikore and Annexe, Melsetter.
T. Gaynor, Fairview, Willowgrove and Brooklyn, Melsetter.
Gifford Bros., Wolfscrag, P.O. Helvetia, South Melsetter.
A. S. Gifford, Wolverhampton, P.O. Helvetia, South Melsetter.
R. Gillbank, Whittington, Chipinga.
Rev. J. E. Hatch, Ingorema, Rusitu Mission, Melsetter.
J. S. Herselman, Ravenswood, P.O. Nooitgedacht, South Melsetter.
G. F. Heyne, Fairfield, Melsetter.
W. H. Hosking (Manager for A. Ward), New Year's Gift, P.O. Chipinga, Melsetter.
J. C. Human, Roslyn, Chipinga, South Melsetter.
J. A. Jansen, Fortuna, South Melsetter.
H. E. Jelliman, Moosgwe, P.O. Penkridge, *via* Umtali.
A. H. Joubert, Joppa and Merrywaters, c/o J. A. Jansen, South Melsetter.
A. S. Joubert, Groenvlei, P.O. Chipinga, Melsetter.
J. Jollie, Fairfield and Helvetia, P.O. Helvetia, Melsetter.
P. J. Joubert, Mooiplaats, P.O. Chipinga, South Melsetter.
Z. F. Joubert, Kenilworth, Chipinga, South Melsetter.
T. Kay, Chipinga, Chipinga, Melsetter.
F. J. Keene, Fallowfield, P.O. Helvetia, Melsetter.
T. King, Mount Selinda, Mount Selinda, Melsetter.
F. King, Holland, Chipinga, South Melsetter.
A. King, Pasture, P.O. Penkridge, Umtali.
J. G. H. Klopper, Landsdown, Chipinga, South Melsetter.
L. Kleijn, Heathfield, P.O. Melsetter.
J. H. Kok, Belmont, Melsetter.

J. C. Kotze. Petrus Ville, P.O. Chipinga, South Melsetter.
Kruger Bros., Heilrand and Morgenson, Chipinga, South Melsetter.
B. J. Lombard, Lombard's Rust, North Melsetter.
S. J. Lombard, Kronstad, North Melsetter.
W. M. Longden, Sawerombi, Nyhodi, Nyaruma, Orange Grove, Orange Grove Annexe and Roede, Melsetter.
C. H. Marais, Ostend, North Melsetter.
J. Martin, Rocklands, Dunblane, Clifton, Westfield, Melsetter.
P. S. Martin, Vooruitzicht, Melsetter.
A. Miller, Eastleigh, Helvetia, South Melsetter.
J. J. Moolman, Nooitgedacht, Inhoek and Avontuur, P.O. Nooitgedacht, Melsetter.
C. L. Mulling, Woodbine, Chipinga.
J. Meyers, half of Flenters and Daisy Hill, Chipinga, South Melsetter.
G. F. Mynhardt, Merino, Mount Selinda, Melsetter.
J. H. Nieuwoudt, Wolvedraai, P.O. Chipinga, South Melsetter.
P. G. Odendaal, Grass Flats, Mount Selinda, South Melsetter.
W. N. Odendaal, Houtberg, P.O. Mount Selinda, South Melsetter.
A. D. Olwage, Lindley, Melsetter.
J. A. Olwage, Lemoenkop, Melsetter.
J. M. Orpen, Glendalough, Chipinga.
G. D. Otterson, Stirling, Mount Selinda, South Melsetter.
J. N. Papenfus, Highlands, Melsetter.
J. G. Raath, Smalldeel, Mount Selinda, South Melsetter.
A. J. Rautenbach, Wedge Hill, Nooitgedacht, Melsetter.
H. Remmer, Thornton, Melsetter.
N. N. Rutherfurd, Tom's Hope, North Melsetter.
J. B. Schultz, Devon, Chipinga.
S. J. G. Schultz, Avontuur, Morgenson, South Melsetter.
J. W. Scott, Vermont, Arbroath and Canterbury, P.O. Chipinga, Melsetter.
C. R. Serfontein, Hofstede and Roemrijk, Chipinga.
T. E. Serfontein, Rookwood and Constantia, P.O. Chipinga, South Melsetter.
P. E. Shinn, Knutsford, Chipinga, South Melsetter.
C. C. Steijn, Pietershoek, North Melsetter.
H. Steijn, Hendriksdal, North Melsetter.
C. J. F. Steijn, Bull's Run, Melsetter.
J. G. F. Steijn, Diepfontein, North Melsetter.
J. G. Steijn, Weltevreden, P.O. Melsetter.
J. G. F. Steijn, Johannesrust, North Melsetter.
J. J. Steijn, Greenmount, Melsetter.
L. C. Steijn, Lusthof, Melsetter.
T. F. J. Steijn, Ruwaka, Penkridge, Melsetter.
P. W. J. Steijn, Steijnsbank, North Melsetter.
C. F. M. Swynnerton, Gungunyama and Umzila, Melsetter.
B. van der Linde, Sterkstroom, P.B. Fortuna, Melsetter.
J. G. Visser, Haartebeestenek, Chipinga, Melsetter.
J. T. Webster, Grasslands, Penkridge, North Melsetter.
W. G. Webster, The Meadows and Redwood, P.O. Chipinga, South Melsetter.
T. O. Willows, Brackenburg, Zebra, Cambridge and Gwendingwe, Melsetter.

St. Faith's Mission Dip.

By the Rev. E. Lloyd.

This dip is constructed of stone, and is a little short of forty feet in length. The plan and specifications given in Bulletin No. 242, issued by the Department of Agriculture, were followed, with certain slight variations. Rhodesian cement was used.

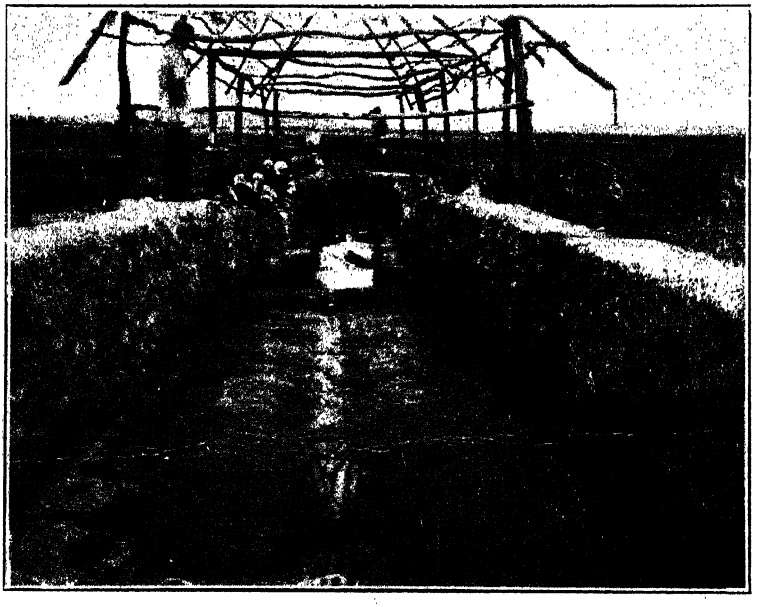
The building of this dip is interesting as giving an instance of native co-operation, and of a stone dip being built and supervised by a European amateur, who had had no previous experience whatsoever in this particular class of work, or of following any plan.

Much of the stone was picked up near granite kopjes, and a certain amount was quarried by the aid of wedges, a jumper and a big hammer. Most of the natives were quite new to this kind of work, but learnt quickly. No attempt to trim the stone was made otherwise than shaping it very roughly indeed with hammers. Trimming the stone was quite beyond our skill and experience.

The whole work was done by natives, who took, according to native custom, a turn a week. About 35 natives in different capacities were so employed for a couple of months in digging, carting and laying the stone. The European amateur had to be there constantly when the cement plastering was being done, seeing to the mixing, etc. We had no experience of cement plastering, but followed carefully the book instructions and hints given by a friendly builder. Natives did the whole of the cement plastering, but under the constant supervision of the European.

This dip loses very little solution, on account of the high walls of the plunge and around the dipping tank. The dip cost little beyond the actual cost of cement, wire, tar, tools,





Stone Dipping Tank at St. Faith's Mission, Rusape.

etc. It included, however, the loan of wagon and donkeys and unpaid supervision of the European amateur. A sum not exceeding £10 was paid in labour, and perhaps altogether the dip cost £40 or £45, including tools, etc. The natives who assisted are charged ½d. a head all round for dipping.

So far 800 head of cattle are being dipped in this dip, and it has answered admirably. Cooper's dip is used.

Spaying Sows.

The practice of spaying sows is not yet commonly followed in this country, and its advantages are perhaps not fully appreciated. The operation is, of course, confined to sows that are destined for the butcher or the bacon factory, in which case the first object is to fatten as evenly as possible, so that the best product may bring the best price; and the second aim is to fatten as quickly as possible, so that the time and cost of feeding may be reduced to a minimum. The spaying of females materially assists in both directions. A sow spayed at from three to six months old makes a smooth, solid, high-class bacon hog. She fattens without check from the time she is spayed till ready for the butcher. At the age of six or seven months a sow is capable of breeding, and, if put into the fattening pen with others without being spayed, will be in heat for approximately three days out of every thirty, and will be a nuisance to herself and to the others with her. She loses flesh during those three days, and takes another three days to recover lost ground. Thus, from the fattening point of view, an unspayed sow loses six days in thirty, or one-fifth, and in the end never makes as good a porker or bacon pig as she would have been if spayed.

Hereford Breeders' Society.

A well-attended and most representative meeting of Hereford breeders was held at Johannesburg during the recent Rand show week, when it was decided to form "The Hereford Breeders' Society of South Africa."

It was decided that under the auspices of the society only pedigree heifers be accepted for entry in the Stud Book, but to include all appendix registered stock up to the date of the meeting.

A special committee was appointed to formulate the constitution and rules, to be submitted for final approval to a general meeting of the society to be held at Johannesburg during the Rand fat stock show week.

It was further decided to hold a meeting of Hereford breeders at the Bulawayo show next month (31st May), with a view to submitting the claims of the society to the Rhodesian breeders, and from which source it is expected a large measure of support will be forthcoming.

Mr. J. C. Torrance, Box 4344, Johannesburg, was appointed secretary and treasurer, and all intending members, and others interested in the breed, are requested to communicate their names and addresses to him, when fuller information on the subject will be forthcoming.

Correspondence.

RATIONS FOR POULTRY.

In reply to an enquiry regarding the feeding of poultry addressed to the Department of Agriculture by an admitted novice, our valued contributor, Mr. Sheppard, forwarded the following information, which, owing to its practical and interesting nature, we publish for the benefit of many readers who are likely to be interested:—

"As you appear to have a large number of birds, they will doubtless be divided into breeding birds and egg layers. To get the best results, the two must be fed on different lines. The breeders must not be fed on a forcing laying ration, that is one containing a high percentage of raw meat, green cut bone or meat or fish meal, but the layers may be treated as egg machines, as it is only quantity of eggs that is required, not quality.

"Presuming you are going to use locally-grown grain, that is, munga, mealies, rapoko, etc., quite a good soft food may be made from these. Personally, I have tried numerous mixtures and experiments with the local grains, and now rely entirely on munga, mealies, dhal and sunflower, also green food, meat and sometimes a little wheat bran. Mealie bran is of little use; it has very little feeding value, is chiefly husk, and should not be given to fowls. The best soft food I have been able to make, and I am confident it is as good as can be got from our local grains, taking into consideration the cost, of course, is composed of meat, munga, mealies finely crushed, cabbage and dhal leaves, all boiled up together till all the water is boiled away and the mash is almost dry. The dhal and cabbage are first put through a chaff cutter before being added to the mash. I am at present, owing to the high price of munga, using one part of munga to one part of mealies.

With munga at a reasonable price, I use one of mealies to, say, two of munga (in bulk).

"To this mash I sometimes add a little finely crushed charcoal dust, and sometimes a little salt. Wheat bran is also a useful addition now and then; just a little may be used to dry it off. The usual proportion of meat to be added to a soft mash for fowls is 10 per cent., that is when sharps, bean meal, etc., are used, but this percentage may be exceeded when using our local grains. If one of the manufactured meat or fish meals is used, 1 lb. for every hundred birds is about right, but again, when using the local grains, 1 lb. to every eighty birds would not do any harm. These amounts are quite safe to be given to breeding stock, and may be exceeded when fed to 'egg machines.' Lewis Wright says a bird in full-lay requires 2 ozs. of fresh meat daily, but that is most excessive, especially for Rhodesia. If biltong is used as meat, of course it is a highly concentrated essence of meat, and should be used in the same proportion as meat meal. This mash is clean to handle (except when the powdered charcoal is added), and its preparation can be left to a good reliable native, as it is possible to tell at a glance almost whether the proportions are about correct, which is impossible with a mash composed of sharps, bean meal, etc., and bran.

"Personally, I use dip drums for cooking the mash in, and find they last several months if not used in direct contact with the flames of the fire.

"This mash I feed as an evening feed all the year round to the adult stock, but on cold frosty mornings I also give a very small feed of warm mash. This I give to the birds as soon as they turn out of their houses immediately they wake. This feed must be given *immediately* the birds turn out, or its beneficial effect is lost.

"As a grain food, I rely almost entirely on mealies finely crushed, dhal and munga, a little sunflower, mixed to the following proportions or thereabouts:—Mealies 2 parts, munga 2 parts, dhal 1 part, sunflower ½ part.

"The dhal is cracked. This grain food I feed half early morning and half about 10 o'clock—fed in litter in the shade.

This system keeps the birds scratching continually from daylight to about mid-day. At mid-day green food (fresh) is given during the winter months, otherwise I give no green food other than what is boiled in the soft food.

"On cold frosty mornings, when a small feed of soft food is given immediately the birds wake, the feeding is as follows:—They do not get more food during the whole day, but they get four feeds instead of three. Say a pen of seven birds; they get one-third of the day's ration of soft food as soon as they wake; immediately afterwards, that is, as soon as it is possible to get round the pens again (really about half an hour), they get two handfuls of grain food in the litter; at 10 o'clock they get two more handfuls. Evening feed: the remaining two-thirds of soft food and one handful hard food mixed in with it. Under ordinary circumstances they would get three handfuls of grain food early morning, two at 10 o'clock, and full ration, if soft food, in the evening. This is, of course, for birds in confinement. On free range I feed my birds on exactly the same system, only a smaller ration of food.

"As regards green food, I have Napier's fodder and dhal in all my pens, also for the birds on free range. If this were not so, I would give a mid-day feed of green food all the year round. Of all our local grains, munga is the best and rapoko the worst. At present I am substituting Napier's fodder for cabbage in the mash. It has a strange appearance, and is rather hard when boiled, but is relished by the birds.

"If skim milk is available, a rice pudding made with skim milk and dried off with bean meal makes an excellent soft mash, but do not boil milk and meat together. If the rice pudding is given, meat and green food should be given at another time of the day.

"Above all things do not forget the lime and grit.

"A fowl requires 6 per cent. of mineral salts in its food to keep it in perfect health. All our local grains are deficient in these, and they must be supplied artificially if possible.

"Slaked lime, boiler scale, or oyster shells should be supplied; also grit if the birds are not on sand veld."

EEL-WORM.

To the Editor,

Rhodesia Agricultural Journal.

Sir,

The following may be of assistance to farmers in Southern Rhodesia.

Five years ago I planted tobacco on old native gardens. The crop was a failure, the plants turning yellow and flowering low. Believing it to be the result of imperfect cultivation or a bad season, I planted the land again with tobacco the year following. The crop was worse than that of the year previous, and I did not cure, from a 30 acre field, more than 200 lbs. to the acre. Fortunately an expert saw the tobacco in the field, and at once diagnosed "eel-worm." We then found that the infestation was a bad one, the tobacco roots being all lumps and knots.

Having read in an old Cape *Agricultural Journal* that a few seasons under mealies might remove the pest, I handed the land over to natives on condition that they should sow nothing but mealies and monkey-nuts. They grew these crops for two seasons.

This last planting season I again tried tobacco. The crop is certainly a poor one, but is absolutely free from eel-worm, so that two seasons fallow or under a crop on which they do not feed is evidently quite sufficient to clear the land of this pest.

I have found eel-worm in small patches on several farms, and am inclined to think that it must live on the roots of indigenous plants. With the exception of English potatoes and the banana plant, both very little grown, the native plants nothing from roots, so a fairly wide distribution of the pest is difficult to account for except on the ground that the eel-worm we have here is indigenous to the country.

Yours, etc.,

HENRY RANGELEY.

Fort Jameson,
31st March, 1917.

The Agricultural Outlook.

District reports as to the condition and prospects of live stock are very satisfactory. The late rains, generally speaking of little or no assistance to growing crops, had a most beneficial effect upon the pastures and water supplies throughout the country. On ranches, where the grass was already shewing signs of drying off, the ground has received an appreciable addition of moisture that has freshened up the veld, and will probably be sufficient to ensure the early springing of new grass directly the frosts are over. Winter prospects are now distinctly favourable for stock.

Reports as to the state of the crops are variable and sometimes even contradictory from the same district. This was to be expected, in view of the erratic distribution of the rainfall. In some of the most important grain districts we hear that the last rains have been highly advantageous to what we may call the "Imperial Acre," that is the extra land put under late maize as the result of the Imperial offer in December, so that crops will be reaped in cases where hope of them had been given up. On the whole, however, crop prospects have not been materially modified since we wrote in April.

Veterinary Report.

March, 1917.

AFRICAN COAST FEVER.

SALISBURY AND MAZOE DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the existing centres of infection. It is now twelve months since the last case of disease in Salisbury district.

MREWA DISTRICT.—No fresh outbreaks. At existing centres of infection the following animals were destroyed:—Four at Exeter, 3 at Manyukwi and 6 at Nyakambiri.

GWELO DISTRICT.—No fresh outbreaks. At the Riverbend infection centre three animals were destroyed.

MELSETTER DISTRICT.—No fresh outbreaks. The following mortality occurred at existing centres of infection:—Wolverhampton, 3 head; Woodstock, 1 head; Weltevreden, 2 head; Kronstad, 1 head.

ANTHRAX.

The outbreak at the farm Dovedale, Salisbury district, does not appear to be serious. One case—an ox—occurred during the month. Experimental investigation of the unsterilised bone meal suspected as the source of infection has so far proved negative.

TRYPANOSOMIASIS.

The existence of this infection in cattle at two centres in the Melsetter district was microscopically demonstrated.

BLACK QUARTER.

Thirty-three deaths from this disease reported from the Bulalima-Mangwe district and the Matobo native reserve.

ANAPLASMOSIS AND PIROPLASMOSIS.

Some mortality from these diseases (gall-sickness and red-water) reported from the Bulawayo, Umtali and Marandellas districts.

HORSE-SICKNESS.

The Veterinary Bacteriologist submits the following record of Police horses inoculated last year against horse-sickness, which was obtained from the Police reports for January and February:—No. of inoculated horses, 136; No. re-acting to natural infection, 21; No. of deaths, 2.

In one case death was probably accelerated by travelling the animal too soon after the temperature had subsided.

A considerable mortality from this disease is reported from various districts.

MALLEIN TEST.

Five horses and 14 donkeys were tested with mallein on importation, with negative results.

TUBERCULIN TEST.

The following animals *ex* United Kingdom were tested with tuberculin, with negative results:—Bulls, 12; heifers, 22.

IMPORTATIONS.

Horses, 5; donkeys, 14; bulls 14 (12 *ex* United Kingdom); heifers 122 (22 *ex* United Kingdom).

EXPORTATIONS.

Via Bulawayo, 529 head; *via* Liebig's Drift, 49 head of slaughter cattle; also 37 head of sheep and goats.

April, 1917.

AFRICAN COAST FEVER.

SALISBURY, MAZOE, MELSETTER AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease among any of the existing centres of infection.

MREWA DISTRICT.—No fresh outbreaks; two head destroyed on suspicion; microscopic examinations negative.

BLACK QUARTER.

Thirty-eight deaths reported from the Bulalima-Mangwe and Matobo districts.

CONTAGIOUS ABORTION.

Fresh centres of infection were discovered in the Lomagundi and Mazoe districts.

MALLEIN TEST.

Seventeen horses were tested on importation, with negative results.

TUBERCULIN TEST.

Thirty bulls and 14 heifers from the United Kingdom were tested, with negative results.

IMPORTATIONS.

Bulls, 34 (30 *ex* United Kingdom); heifers 129 (14 *ex* United Kingdom); sheep and goats, 1,454.

EXPORTATIONS.

To Union—Slaughter oxen *via* Bulawayo, 424; slaughter oxen *via* Liebig's Drift, 374; sheep and goats, 179.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

June.

BEE KEEPING.

At this season hives require to be painted; the woodwork, being exceedingly dry, is in good condition to receive it. Linseed oil (unboiled) is the best kind to mix with white lead, as it is more penetrating, acting as a better preservative than boiled oil. Bees will be able to take beneficial flights during warm days, so that dysentery need not be anticipated.

CITRUS FRUITS.

Cultivation of the grove is to be continued and pruning taken in hand towards the end of the month. Washington Navel oranges and some earlier varieties will be ready this month for gathering, packing and despatch.

CROPS.

The harvesting of the smaller crops will now be over, except possibly pea-nuts, mangels and dhal. Pea-nuts should be lifted before the first frosts if possible. Mangels may safely be allowed to remain in the ground until required for use; or, if harvested, should not be heaped, but spread thinly on the ground at a convenient spot. Dhal will not be ripe until the end of the month, when the plants should be cut about a foot above the ground, allowed to dry for a few days, then shaken to free the seeds from the pods. Ploughing should be continued through the month if possible, and, if the maize is cut and stooked on the side of the lands, the maize fields should be ploughed to keep down such pests as the stalk borer. Winter crops of wheat, oats and barley will not require much attention. As a rule, where water is plentiful, too much irrigation is practised. One application per month will generally be found sufficient for the above crops.

DECIDUOUS FRUITS.

Pruning of deciduous trees should be done this month or in July.

ENTOMOLOGICAL.

Cabbage Family.—Plants of this family suffer from cabbage louse and Bagrada bug during June.

Onions.—Suffer from thrip. The transplants may be dipped as far as the roots in tobacco wash or paraffin emulsion to keep down the pest.

Fig.—The winter crop of fruit is liable to suffer from fig weevil. The infested fruit should be collected and destroyed. If this has been done regularly with the first crop, the second crop is not likely to suffer much.

FLOWER GARDEN.

Annuals for early spring flowering should be sown, preferably in boxes in a warm place sheltered from the wind. Perennials, shrubs and ornamental tree seeds may also be sown. Fruit trees, shrubs and roses should be pruned and all dead wood removed. Sweet peas require constant attention.

FORESTRY.

Burn out the grass in any fire traps round or near the plantation that were left unploughed. Any timber that is to be felled should be taken in hand this month.

GENERAL.

Grazing in drier districts is beginning to give out, and steps should now be taken to ensure that some good veld in the neighbourhood of the water is preserved for future use. It is a mistake, frequently seen, for all the grazing nearest to the drinking places to be first consumed, so that later on the cattle, when least able to endure fatigue and when the grass is in any case most scanty and dry, have furthest to walk from the feeding ground to water. A little forethought can obviate this trouble. Live stock are usually in good condition at this time of year and able to travel longer distances to water than may be the case later on in the season. Fire guards to prevent grass fires should be looked to.

POULTRY.

Early hatching should start this month. Stock birds should have been mated up at least ten days or a fortnight before the eggs are used for sitting. See that the male birds in the breeding pens are getting their full share of food. The brooders must be thoroughly cleaned and sprayed before the chicks are placed therein. Give your first feed to the chicks as early as possible each day and the last one immediately before they retire to rest. Their food, also that of poults, should be given little and often.

STOCK.

Cattle.—There is every indication of a good winter season for horned stock, and ranching cattle should not give much trouble. Dipping is best postponed during very cold snaps until a warm day occurs. Cows with autumn calves should be kept in the more sheltered paddocks. A watchful eye should be kept on all watering places in order to prevent their being fouled or stopped up. Bulls should be kept out of the herd until the end of July at least, and, in the meantime, they should be well fed and cared for in order to fit them for their work. The three watchwords in the dairy herd should be feed, shelter and bedding from now onwards. Ensilage will now be found invaluable, as also will pumpkins, majordas or any other form of succulent food. Good hay should be used to rack up with at night, and the maize ration should be supplemented with ground-nuts, ground-nut cake or bean meal. Young calves are better in the pens on very cold mornings until the sun has gained some power, when they may run on short sweet veld for a few hours. The above remarks with regard to dipping and water supply apply equally to dairy as to ranching herds.

Sheep.—As most vleis are still very wet, sheep are best kept on the high veld for a while longer. If grass seeds are troublesome, a grazing area should be mown. If the rams were put into the flock in May, they should now be removed. Ewes with lambs will benefit by a few handfuls of mealies, and perhaps ensilage. They should be provided with shelter from cold winds.

TOBACCO.

If the stubble of the old crop has not been taken out and burnt, it should be done now.

VEGETABLE GARDEN.

All the available space in the garden should now be thoroughly trenched and manured, the soil being well worked and loosened. Vegetables planted out for winter crops should be well and continuously cultivated, which will help to bring them along quicker and with less watering. Late-bearing tomatoes should be sheltered from the cold winds by a grass shield. Beans should be staked and tied. Beet, radish, carrot, parsnip, turnip, onion, leek, mustard, cress and tomatoes may be planted.

VETERINARY.

Horse-sickness should be practically over now. Redwater and gall sickness occur all the year round, but the worst time is the summer, when ticks are prevalent. Blue tongue should be very little in evidence now. After twelve months in this Territory, sheep do not contract the disease. Inoculation can be carried out now. Scab is a poverty winter disease.

WEATHER.

Casual rains may occur, but except on the eastern frontier, none is to be reckoned upon, nor can it be regarded as seasonable or desirable. Frosts generally occur on a few nights during the month of June, and precautions must therefore be taken. This month and the next are the coldest of the year, and when the cold is accompanied by dull weather or "Scotch mist," known locally as "guti," it is apt to have a severe effect on live stock, especially if grazing should at the same time be scarce and water supplies far to travel to.

July.

BEE-KEEPING.

The warmer bees are kept during this month so much the stronger will they come out in the spring. Provide a thickness of 3 inches of cloth coverings over the frames, and where quilts are, on examination, found to be damp, replace them with dry ones. This is a favourable season to carry out repairs to hives. All section and shallow frame combs must be carefully stored away from ants and mice, as these will be wanted for the excellent honey to be stored in them next October, collected from the bush bloom.

CITRUS FRUITS.

Orange trees should be pruned this month, if this work is not completed. Groves must be well cultivated, especially after irrigation has taken place, and the soil round the trees hoed or dug over. Washington Navels will be gathered and some later varieties will be ready for picking. The irrigation of orange trees should be taken in hand when the trees are ready to commence the next growth.

CROPS.

See June.

DECIDUOUS FRUITS.

Pruning may be done this month.

ENTOMOLOGICAL.

Onions.—Thrip is liable to affect this crop, and when present calls for careful attention. Tobacco wash or paraffin emulsion should be used.

Deciduous Fruits.—Scale infested trees may receive a winter wash during this month. Lime sulphur salt wash or scalecide is recommended for this purpose.

Guava.—Citrus growers should always bear in mind that this fruit harbours citrus codling when there is no citrus fruit available. All guava trees, therefore, in the vicinity of citrus orchards should be stripped during this or next month, and the fruit buried deeply or burnt.

Fig.—Fig weevil may still be in evidence. The fruit is also sometimes attacked by citrus codling and other moths. The destruction of infested fruit is the most practical remedy for the pests.

FLOWER GARDEN.

Seeds of most annuals, perennials, shrubs and ornamental trees may be sown. Pruning, if not already done, should be attended to early. Dahlias and other summer-flowering bulbs should be taken up and stored for division and replanting whilst the soil is being prepared. Sweet peas require attention and staking.

FORESTRY.

Cuttings of all ornamental shrubs, roses, etc., should be taken now before the spring growth starts. Plants grown in tins during the previous season should be re-potted as soon as the cold weather is over.

GENERAL.

Veld fires are now liable to occur, and must be watched for and arrangements made to combat them. The loss that may result and the penalties under the Herbage Preservation Ordinance are to be borne in mind. Fire guards should this month be burnt round all grazing which it is desired to preserve for use later on.

POULTRY.

See that your brooder reared chicks are warm enough during the cold nights, but do not overcrowd, and have the brooders well ventilated. Give your chicks as much run as possible when they are able to leave the brooder. There is little fear of rain now, and they will be healthier and develop better with a large shaded run. Do not let the mother hen and her brood sleep on the bare ground; they will probably be attacked by sand fleas.

STOCK.

Cattle.—On ranches the advice given for June applies still. The bulls may again be put into the herd at the end of the month. If grazing has been reserved for the winter months, it will probably be wise to turn the cattle into it now. Watch for any unthrifty cattle, and get them into the home paddock and feed them before they become really poor. Dairy cattle will require heavy feeding now, and if plenty of roughage is available, cows in milk will do better if kept in for a while on cold mornings and turned out only after the warmth of the sun is felt.

Sheep.—Vleis should now be fairly dry and may be utilised; otherwise the advice given for June applies.

VEGETABLE GARDEN.

Sow turnips, beans, peas, onions, cabbage, beet, carrots, parsnips, radishes, lettuce and spinach.

VETERINARY.

Horse-sickness and blue tongue should now have disappeared. Redwater and gallsickness occur all the year round, but the worst time is during the summer, when ticks are prevalent. Sheep may be inoculated against blue tongue now. Scab in sheep will probably be in evidence this month.

WEATHER.

Though rains have fallen during every month of the year in Rhodesia, none are looked for or desired this month. Most stations record an average of .01 to .3 inch over a number of years. Severe cold is likely to occur at this time of year, the lowest temperatures occurring an hour or two before sunrise. Frosts may be looked for, especially on calm clear nights. Cold windy days and damp "guti" weather tell severely on cattle, if shelter and food are not provided.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1917	March	7·57	0·32	0·07	0·24
1917	April	6·39	0·29	0·10	0·21

TEMPERATURES.

Station	March		April	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MASHONALAND—				
Charter—				
Enkeldoorn	81·0	52·7	78·0	50·3
Hartley—				
Gatooma	88·0	47·5	85·2	57·1
Hallingbury Farm	84·5	57·5	82·0	55·0
Hartley Hospital	86·7	58·8	84·91	55·8
Idaho Farm	—	—	80·4	54·4
Lomagundi—				
Eldorado Mine	83·16	59·34	80·5	55·98
Kanyemba	—	—	—	—
Sinoia	86·5	71·5	85·9	67·2
Sipolilo	84·2	60·2	—	—
Makoni—				
York Farm	—	—	—	—
Marandellas—				
Kwenda Mission		—	73·0	60·7
Mazoe—				
Shamva Mine	82·6	62·0	81·1	59·1
Melsetter—				
Melsetter	72·0	53·7	70·9	54·6
Mount Selinda	73·8	69·2	68·5	56·3
Vermont	77·4	60·6	—	—
Salisbury—				
Chishawasha	80·4	58·0	78·4	55·5
Salisbury (Gaol)	82·2	56·5	78·0	54·3
Umtali—				
Chiconga's Location ...	—	—	—	—
Public School	80·2	60·1	—	—
Summerfield	—	—	—	—
Victoria—				
Eythorne	78·1	66·4	77·6	52·2
Morgenster	—	—	—	—
Victoria	77·25	57·88	77·48	55·01

TEMPERATURES—*(Continued).*

Station	March		April	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	83·3	57·2	...	...
Garth	82·9	57·2	86·4	54·0
Plumtree School	—	—	—	—
The Retreat	89·3	—	87·2	—
Bulawayo—				
Observatory	79·7	58·1	77·3	54·6
Gwanda—				
Antelope Mine	84·06	62·77	83·26	59·46
Mazunga	90·9	63·1	91·9	59·0
Tuli	91·8	65·6	83·6	61·5
Gwelo				
Gwelo (Gaol)	80·4	45·7	78·9	43·8
Hagley (Iron Mine Hill) ...	—	—	—	—
Matobo				
Holly's Hope	84·1	58·8	83·04	53·9
Rhodes Matopo Park ...	82·4	57·9	79·8	54·1
Umzingwane				
Essexvale	81·03	57·09	81·3	54·8
Hope Fountain	—	—	—	—
Wankie				
Victoria Falls	87·5	45·6	87·4	42·1
Wankie (Hospital)	91·8	66·0	93·1	63·0

RAINFALL.

Station	March	April
MASHONALAND		
Charter—		
Buhera	4·44	0·87
Bushy Park	2·64	...
Enkeldoorn Gaol	1·48	1·15
Marshbrook	2·69	1·65
Range	2·49	2·15
Riversdale	2·66	1·44
Umniati	3·15	...
Vrede	1·79	0·71
Chibi—		
Chibi	4·03	0·28
Nuanetsi Ranche	2·84	...
Wylde Grove	2·96	0·35
Chilimanzi—		
Central Estates	1·46	1·66
Chilimanzi	3·27	0·56
Driefontein	2·89	
Induna Farm	1·86	2·99

RAINFALL—*(Continued).*

Station	March	April
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	1·75	0·43
Umvuma (Railway)	1·64	1·05
Darwin—		
Mount Darwin	6·88	0·95
Gutu—		
Chingombe	2·73	0·70
Eagle's Nest Ranche	5·35	0·25
Gokomere	2·76	0·66
Gutu	5·17	0·72
Hartley—		
Ardgowan	0·72	0·46
Auchter Leny	—	..
Battlefields (Railway)	4·10	0·60
Carnock Farm	1·78	3·18
Clifton Farm	—	..
Elephant Hill, Battlefields	..	..
Elvington	1·81	1·27
Gadzema (Railway)	0·83	1·83
Garthnor	2·98	1·42
Gatooma	2·16	0·83
Gatooma (Railway)	1·92	0·81
Gowerlands	1·44	1·37
Hallingbury Farm	3·93	1·39
Hartley Hospital	2·34	0·94
Hartley (Railway)	2·32	1·34
Hopewell	1·14	1·58
Idaho Farm	..	2·64
"Jenkinstown"	1·84	1·33
Makwiro (Railway)	1·69	1·24
Philiphaugh	1·93	1·48
Shagari	1·19	1·36
Spitzkop	—	—
"Stoneygate"	0·67	..
Inyanga—		
Inyanga	2·95	1·14
St. Trias' Hill	5·53	1·40
Lomagundi—		
Argyle	1·39	1·32
Banket Junction (Railway)	1·63	1·55
Darwendale	2·48	2·48
Duxbury Farm	4·01	1·96
Eldorado Mine	1·27	1·31
Eldorado (Railway)	1·01	1·25
Lion's Den	1·03	0·87
Lone Cow Estate	3·26	—
Longmead	3·40	2·08
Maningwa	2·70	1·19
Palm Tree Farm	3·93	1·42
Sinoia	2·05	1·27
Sinoia (Railway)	1·37	0·98
Sipolilo	2·18	—
Umvukwe Ranche	3·55	..

RAINFALL—(*Continued*).

Station	March	April
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	3·38	0·86
Chimbi Source	3·83	0·65
Delta	2·63	1·67
Eagle's Nest	5·59	1·88
Ellavale	—	—
Gorubi Springs	5·17	1·82
Headlands (Railway)	5·36	1·91
Mona	4·36	0·78
Monte Cassino Mission	4·47	—
Odzi (Railway)	4·34	1·29
Rusape (Railway)	4·12	1·39
Springs	4·44	1·55
York Farm		
Marandellas—		
Bonongwe...	4·37	1·58
Huish Estate	4·42	2·91
Kwenda Mission	3·77	0·60
Land Settlement Farm	2·13	1·71
Macheke (Railway)	2·84	2·85
Marandellas	—	—
Marandellas (Railway)	—	0·81
Nelson	3·14	0·85
Selous Nek	3·51	2·20
Theydon	3·81	—
Tweedjan	2·38	1·42
Verdoy		
Mazoe—		
Avonduur	4·23	
Bindura	5·50	4·07
Bindura (Railway)	—	4·36
Ceres	5·49	5·06
Chipoli	9·47	1·77
Citrus Estate	4·43	3·30
Dunmaglas	4·98	3·92
Jumbo (Railway)	3·95	2·54
Kilmer	—	—
Kingston	4·78	4·44
Laguaha	4·73	—
Lowdale	3·83	
Mazoe	4·32	1·98
Mguta Valley	—	—
Omeath	2·69	2·55
Protea Farm		
Ruia	3·35	3·06
Ruoko Ranche	2·09	1·94
Shamva	5·38	3·08
,, Mine	6·34	3·23
Stanley Kop	2·62	1·81
Sunnyside	3·73	—
Teign	4·09	3·27
Virginia	2·70	—
Volynia Ranche	4·40	

RAINFALL *(Continued).*

Station	March	April
Mashonaland—(Continued)		
Mrewa—		
Glen Somerset	5·51	2·03
Mrewa	3·99	1·67
Mtoko—		
Makaha	1·59	2·15
Mtoko	2·28	1·19
Melsetter—		
Brackenburg	20·33	2·59
Chikore	25·77	3·11
Chipinga	15·78	3·44
Helvetia	21·18	4·75
Melsetter	18·89	3·55
Mount Selinda	36·01	4·74
Mutambara Mission	4·19	0·84
Pasture	5·39	3·74
Tom's Hope	7·87	3·44
Vermont	24·52	
Ndanga—		
Bikita	20·07	2·04
Chiredzi Ranche	11·82	
Marah Ranche	6·21	1·28
Ndanga	11·66	1·42
Pamushana	6·95	1·12
Salisbury—		
Ardbennie	1·99	
Avondale	1·45	2·19
Botanical Experiment Station	1·87	
Bromley	2·44	
Brookmead		
Borrowdale (Hatcliffe)	2·23	1·70
Chishawasha	2·59	1·77
Cleveland Reservoir	1·61	1·91
Ewanrigg		
Forest Nursery	1·67	1·67
Goromonzi	3·58	2·72
Gwebi	3·38	2·44
Glenara	1·69	
Hillside	3·50	2·38
Lilfordia	2·32	1·10
Salisbury (Gaol)	3·64	2·48
,, (Railway)		
Sebastopol	1·09	1·94
Selby	3·12	2·34
Stapleford	3·34	
Sunnyside	2·20	
The Meadows	5·00	2·12
Vamona	1·52	2·33
Westridge	2·42	3·56
Umtali—		
Chiconga's Location	—	—
Odzani	7·28	2·20
Penhalonga	10·17	4·93
Premier Estate	4·79	1·93
Public School	7·06	

RAINFALL *(Continued).*

Station	March	April
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	4·72	1·94
Stralsrund	6·96	2·21
Summerfield	—	—
Umtali (Railway)	—	2·55
Utopia	4·80	—
Urungwe—		
Nassau Estate	2·91	3·74
Victoria—		
Brucehame	2·17	0·56
Clipsham	3·28	0·87
Empress Mine	3·43	—
Eythorne	4·67	0·94
Fairburn	2·70	0·54
Fort Victoria (Railway)	2·76	2·69
Marthadale	7·92	0·59
Makorsi River Ranche	7·09	0·63
Morgenster	9·50	1·48
Silver Oaks	2·88	2·42
Victoria	2·62	2·48
MATABELELAND :		
Belingwe—		
Tamba	0·85	1·25
Wedza	3·65	1·24
Bubi—		
Bembesi (Railway)	0·96	2·00
Imbesu Kraal	0·68	0·07
Inyati	0·32	1·32
Maxim Hill	0·79	4·64
Shangani Estates	0·77	—
Bulalima-Mangwe—		
Empandeni	0·72	—
Garth	1·36	0·74
Mholi (late Magot)	0·80	0·75
Plumtree School	—	—
The Retreat	0·26	1·01
Riverbank Farm	0·61	1·54
Solusi Mission	0·46	2·25
Syringa	0·25	1·32
Tegwani	—	—
Tjompanie	0·37	0·94
Bulawayo—		
Government House	—	—
Keendale	1·17	3·63
Khami	0·56	3·55
Lower Rangemoor	0·72	3·05
Observatory	0·69	3·16
Raylton (Railway)	0·54	3·31
Umgusa	—	—
Umkien	—	
Gwanda—		
Antelope Mine	0·53	0·52
Gwanda (Gaol)	0·77	0·64

RAINFALL *(Continued)*

Station	March	April
Matabeleland—(Continued)		
Gwanda—continued		
Gwanda (Railway)	0·78	0·77
Lamulas	0·90	2·93
Langalanga	0·25	1·55
Makalali	0·52	2·36
Manantji	0·32	0·91
Mapande	0·49	0·27
Mazunga	0·65	2·47
Mtshabzi Mission	1·29	0·82
Tuli	0·08	1·23
West Nicholson (Railway)	0·65	1·42
Gwelo—		
Daisyfield	1·17	1·49
Dawn	0·99	0·25
Globe and Phœnix Mine	1·76	0·59
Globe and Phœnix (Railway)	—	0·77
Gwelo (Gaol)	1·12	0·41
Gwelo (Railway)	1·21	0·33
Hagley	—	—
Hunter's Road	1·73	0·39
Indiva Farm	—	—
Lalapanzi (Railway)	2·05	3·10
Lovers' Walk	1·49	—
Lower Gwelo	0·70	1·17
Oaklands	2·42	0·27
Que Que	—	—
Rhodesdale Estate	2·27	0·31
Sikombela Farm	5·62	0·25
Troy	—	—
Woodendhove	1·17	1·71
Insiza—		
Albany	2·41	0·69
Anglo-French Block	—	—
Filabusi	0·87	0·66
Fort Rixon	2·25	—
Infiningwe	1·70	—
Insiza (Railway)	1·15	0·76
Inyezi Farm	1·71	0·74
Orangevale	3·01	2·13
Roodeheuvel	2·36	1·05
Scaleby	—	—
Shangani (Railway)	0·67	—
Thornville	2·42	2·18
Matobo—		
Holly's Hope	0·84	0·39
Matopo Mission	1·63	3·47
Rhodes Matopo Park	0·57	2·51
Nyamandhlovu—		
Gwaai (Railway)	2·35	1·81
Edwaleni	—	4·05
Impondemi	—	—
Melinakanda Junction	1·12	—
Naseby Farm	0·56	2·31
Nyamandhlovu (Railway)	0·37	2·61

RAINFALL *(Continued).*

Station	March	April
MATABELELAND—(Continued)		
Selungwe—		
Gokwe	4·00	—
Inyoka	5·33	0·77
Selukwe—		
Hillingdon	2·88	1·14
Selukwe (Railway)	4·25	0·46
Tokwe River Ranche...	6·98	1·45
Umzingwane—		
Balla Balla (Railway)	1·77	0·77
Crombie's	1·95	2·32
Essexvale	1·05	1·28
Heany Junction (Railway)	1·15	2·80
Hope Fountain	—	—
Springs Farm	1·79	2·93
Wankie—		
Dett (Railway)	1·57	2·60
Bombusi	—	—
Malindi (Railway)	—	—
Victoria Falls	0·89	0·61
Victoria Falls (Railway)	0·94	0·48
Wankie Hospital	2·05	0·25
Wankie (Railway)	1·47	Nil

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917		
			June	July	August
Beatrice Road	Various farmhouses	H. W. Harris	13	11	8
Bembesi	Queen's Mine Hotel	V. C. Andrews	1	6	3
Bindura	Bindura	C. J. Glen	9	14	11
Bromley	Bromley	A. A. Draper	7	5	2
Charter—Mgezi	Beatrice Mine	W. Krienke	27	25	29
Central	Umvuma	— James	30	28	25
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	8	13	10
Enterprise	Arcturus Hotel	J. G. M. Bernard	6	4	1
Felixburg	Felixburg	R. H. Brown	9	14	11
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	2	..	4
Gatooma	Gatooma	T. J. Golding	16	21	18
Gazaland	Chipinga	W. Wood	30	28	25
Greystone	Roodeheuvel Farm, Shangani	J. W. Spencer	9	14	11
Hartley	Hartley	J. de L. Nimmo	..	..	..
Headlands	Headlands	J. M. Harvard	30	..	25
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	9	14	11
Insiza—Shangani	Shangani	T. E. Penny	2	..	..
Inyazura	Inyazura	A. C. Curling	20	18	15
Iron Mine Hill	Iron Mine Hill	T. Irving	9	14	11
Lalapansi	Lalapansi	N. A. Bradford	16	21	18
Lomagundi	Sinoia	A. H. Layard	16	21	18
Lydiate	Norton	W. Wrench	30	28	25
Macheke	Macheke	J. Cheyne	No fixed dates		
Makwiro	Makwiro	C. D. Voigt	15	20	17
Marandellas and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	2	7	4
Makoni	Rusape	H. Barnes Pope	2	7	4
Makoni North	———	———	30	28	25
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	6	4	1
Matopo Branch, R.L. and F.A.	Sibali	———	..	11	..
Mazoe	Glendale Siding	A. G. McCall	6	4	1
Melsetter (North)	Various farms	Rev. R. Wodehouse	2	..	..
Midlands	Gwelo	A. Cox, Box 93, Gwelo	8	13	10
Northern Umtali	Farm "Summerfield"	R. O. H. Blurton	..	..	4
Norton and District	Norton Siding	———	2	7	4
Que Que	Que Que	E. J. Ross	16	21	18
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	29	27	31
Shamva	Shamva	Wm. Scott	..	18	..
Selukwe	Selukwe	F. S. Clark	No fixed dates		
Somabula and Shangani Flats	Welteyrede School	G. B. Botha	..	14	..
Umvukwe	Various ranches	S. A. S. Colborne	9	14	11
Umtali	Christmas Pass Hotel	J. S. Holland	2	7	4
Victoria	Victoria	John Rennie	1	6	3
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	9	14	11

Departmental Notices.

Information for Farmers

The Department of Agriculture is prepared to furnish to farmers technical advice either by correspondence, or, where possible, by personal visits. All communications should be addressed in the first instance to the Director of Agriculture.

Crops

The Agricultural Branch deals with enquiries relating to agricultural practice, soils, crops, cultural operations, processes, seeds, trees, farm implements and machinery, etc.

Disposal of Pure Seed.

Farmers devoting special attention to the production of pure seed of any locally grown crops are invited to communicate with the Government Agriculturist, and at the same time to submit a ¼ lb. sample of any seed which they may have for disposal.

In addition to indicating the total amount of seed offered and the price f.o.r. the nearest railway station or siding, the correct name of the variety and the origin of the seed from which the crop was grown should be given. In the case of special attention having been devoted to seed selection, the methods employed should be described.

Where these stipulations are complied with, and the samples forwarded are deemed by the Agriculturist of sufficiently high quality for seed purposes, growers and intending purchasers will be put in touch with one another. It is hoped by this means to encourage the production of pure seed, and growers are urged whenever possible to sell their seed under guarantee of trueness to name, type and sample deposited with the Department.

After placing growers and would-be purchasers in touch with one another, the Department can accept no further responsibility except in the position of adjudicator when bulk supplies are thought inferior to sample and description, in which case both parties will be required to abide by the decision of the Department.

For further particulars see article on Pure Seed Supply, *Rhodesia Agricultural Journal*, February, 1914.

Poisonous Plants

It is of great importance that as soon as possible a study should be made of those plants found in Southern Rhodesia which are poisonous or deleterious to small or large stock. Farmers and others who have known, or suspected poisonous plants on their property, are requested to communicate with the Government Agriculturist and Botanist, Department of Agriculture, Salisbury, at the same time forwarding specimens of the plant, including stem, leaves, flowers, and, where possible, fruit. Any particular regarding the habits of the plant will be welcomed, and in return the Department will supply all available information regarding the plants.

Live Stock

The Animal Industry Branch is prepared to advise with regard to all matters connected with stock breeding, selection, feeding and registration of stud animals, the dairy industry, poultry management, farm buildings for stock, and kindred subjects. Buyers and sellers of stud stock in Rhodesia are also put in touch with one another.

Entomology

The Government Entomologist advises on matters connected with insect pests of live stock, crops, and fruit trees, and also undertakes the inspection of nurseries and of the importation of plants from abroad.

Chemical Analyses

The Government Agricultural Chemist deals with matters relating to the composition of soils, fertilisers, farm produce of vegetable or animal origin; also the investigation of poisons and of articles of potential economic value.

Nominal charges are made, which, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

A schedule of charges and directions for taking samples will be furnished on application.

With all analyses, reports will be furnished explanatory of the results and, when possible, advice given as to the nature, properties and value of the material.

No charge will be made for analysis where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Citrus Culture

The Government Citrus Adviser advises on all matters connected with the citrus and deciduous fruit industry.

Services of Government Veterinary Surgeons

1. The services of Government Veterinary Surgeons are available to the public, free of charge, for the following purposes only :—

(1) Attending and giving professional advice in connection with the following diseases, viz. :—Anthrax, Contagious abortion, East Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Foot-rot, Heartwater, Glanders, Intestinal parasites amongst sheep and goats, Liver Disease, Lungsickness, Osteo Porosis, Malarial Catarrhal Fever (blue tongue), Rabies, Redwater, Rinder-

pest, Scabies, Sponziekte (quarter evil), Swine Fever, and any other diseases which may in future be scheduled in terms of section 3, sub-section 18 of the "Animals Diseases Consolidation Ordinance, 1906." Attending to cases of disease amongst live stock which, though not of a contagious or infectious character, may be of general public importance.

(2) Applying tests in regard to Glanders, Tuberculosis, or any other disease against the introduction or spread of which tests are applied under regulations.

(3) Inoculations against the following diseases :—

Horsesickness, Lungsickness, Anthrax, Quarter Evil, Redwater, Malarial Catarrhal Fever (blue tongue). A fee to cover the cost of serum and virus will be charged.

2. The following charges shall be made and payable for services rendered by the Government Veterinary Surgeons in other cases, viz. :—

	£	s.	d.
(1) For every professional visit within three miles of his office or residence	0	5	0
(2) For every professional visit beyond such distance	0	10	6
plus an additional charge of 2/6 per hour whilst engaged in such visits or £2/2/0 a day of 24 hours;			
(3) For advice given at the Veterinary Surgeon's office, for each animal, per visit	0	2	6
(4) The following to be charged in addition to visiting fees :—			
a. For every examination as to soundness, each	1	1	0
b. For castration, horses, each	1	1	0
c. For castration, bulls, each	0	5	0
d. For castration, donkeys, each.. ...	0	10	6
e. For parturition cases, mares, each	2	2	0
f. For parturition cases, cows, each..	1	1	0
g. For other operations, according to nature, from 5/- to £2/2/0.			

3. Double the above fees will be payable for services rendered on Sundays, public holidays, and between the hours of 7 p.m. and 7 a.m.

4. Applicants for the services of Government Veterinary Surgeons must at their own cost provide the necessary transport for the conveyance of these officers from, and back to, their residence or nearest railway station.

5. Farmers and owners of stock throughout the country frequently telegraph for a Government Veterinary Surgeon to be sent to attend an animal which has been taken seriously ill. It is rarely possible to comply with these requests at once, as the Veterinary Surgeon may be engaged on duty which he cannot leave, or is at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the veterinary staff discredited. To obviate this, in all cases where veterinary advice and assistance are required, the owner should telegraph to "Veteran," Salisbury, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This will enable the Chief Veterinary Surgeon to telegraph advice at once and state whether he is able to arrange for veterinary attendance on the case or not, and save valuable time, which is always of importance in acute cases.

6. The services of Government Veterinary Surgeons will only be available for private work with the consent of such officers, and when such work does not interfere with their official duties, or when the services of a private practitioner are not available.

7. As the arrangement of allowing Government Veterinary Surgeons to attend to private cases is intended purely for the benefit of farmers and stock-owners who may wish to obtain professional advice, no responsibility whatever will be accepted for any loss of stock, etc., which may result from the negligent treatment or advice, or wilful default, of any Government Veterinary Surgeon.

8. All fees collected in terms of these Regulations are payable to the Treasury through the local Receiver of Revenue.

Irrigation

From the Agricultural Engineer assistance may be obtained by farmers for the following :—

1. In the locating of possible irrigation projects.
2. In the preparation of surveys or plans and for irrigation works, including weirs, dams, furrows, pumping plants, and determining the extent of land which may be brought under irrigation schemes, together with rough estimates of costs.
3. In the supervision of construction and carrying out of projects.
4. In the selection of suitable sites for boring operations.
5. Preparing specifications, etc., regarding pumping plants, windmills, and agricultural machinery.
6. Giving general advice on cognate subjects.

Informal advice of a general character will be given to applicants making enquiry by letter or in person. Any applicant desiring professional assistance likely to occupy more than one day should apply for advice in writing. All applicants should specify clearly the nature of the project on which they seek advice, and should give full particulars as to the distance and direction of their farms from some well-known centre. Applicants will be required to provide suitable means of transport for the officer concerned during the period devoted to work on the spot; to provide any unskilled labour that may be required; and to provide for any other contingent services. Applications should be addressed to the Director of Agriculture, who will endeavour to arrange visits as far as possible in order of application, but with due regard to situation, in order to obviate unnecessary travelling and delay. The services of the Agricultural Engineer are given free, but in cases demanding prolonged individual attention, or repeated supervision, a charge may be made according to circumstances.

Samples

In connection with enquiries, especially with regard to diseases amongst crops, insect pests, soils, grain and the identification of plants, specimens should, wherever possible, be

sent, together with full details. It is found that such parcels are often forwarded without any indication of where they are from or why they were sent and it is difficult in such cases to trace the sender. It is, therefore, requested that persons when forwarding samples for examination, indicate clearly their names and addresses on the packages, so as to enable their requirements to be attended to without delay.

The Analysis of Agricultural Products, Soils, Water, etc.

SCALE OF CHARGES.

Arrangements have now been made for the chemical examination of soils, grain, and other produce, oil-seeds, milk, water, fertilisers, etc., on behalf of farmers and others by the Chemist attached to the Department of Agriculture. The charges made, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject, should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

Schedule of Charges.	£	s.	d.
1. Partial analysis of a manure or feeding stuff, for each constituent	0	5	0
2. Complete analysis and valuation of a manure or feeding stuff	1	0	0
3. Analysis of agricultural products, *e.g.*, grain, hay, roots, etc.	1	0	0
4. Analysis of water for agricultural purposes, irrigation or drainage	1	5	0
5. Partial analysis of soil to determine fertility and recommendations as to manurial treatment	2	0	0
6. Complete analysis of a soil	3	0	0
7. Milk—determination of total fat and solids ...	0	5	0
do. do. of fat only	0	2	6
do. complete analysis	0	10	0
8. Cream—determination of fat only	0	2	6
do. complete analysis	0	10	0

	£	s.	d.
9. Analysis of cheese	0	10	0
10. Limestone—estimation of percentage of lime	0	5	0
do. complete analysis	1	0	0

Remittances should accompany samples submitted.

No charge will be made where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Directions for Taking Samples of Soils.

It is recommended to select four or five spots at least, per acre, taking care that these represent as far as possible the general character of the soil of the field. If the soil of the area to be reported upon presents notable differences, the samples gathered from the different parts must be kept separate.

Having selected a proper spot, pull up the plants growing upon it and remove surface accumulations of decaying leaves, etc., if any. Dig a hole about twelve inches deep and trim one side so as to be smooth and vertical; from the side so prepared remove with the aid of a sharp spade a slice of uniform thickness—about three or four inches—down to a depth of nine inches. Place the slice on a clean board or cloth and mix thoroughly with similar slices obtained in the same way from other parts of the field area. About six pounds of the mixture are then placed in a clean cloth bag or wooden box. Forward with the sample the following particulars:—

Date of collection, exact location, position (hillside, vlei or flat), peculiarities of soil or sub-soil, behaviour in wet and dry seasons, crops borne, previous manurial treatment, and every circumstance in fact which will throw light on its agricultural qualities.

Directions for Taking Samples of Grains, Produce and Feeding Stuffs.

Grains, meal and feeding stuffs and all agricultural produce should be sampled in the same manner as prescribed for fertilisers.

When the feeding stuff is in the state of cake, select not less than three cakes where the quantity does not exceed one

ton, not less than five cakes when the quantity does not exceed five tons, and not less than ten cakes when the quantity exceeds five tons.

Break the selected cakes into small pieces, mix them together, and take the sample—not less than one pound—from the mixture.

Directions for Taking Samples of Fertilisers.

If delivered in bags, select not less than two bags when the quantity does not exceed one ton, and one additional bag for every additional ton.

In no case need more than ten bags be selected.

Empty the selected bags separately on to a clean wooden or stone floor. Thoroughly mix the contents, and set aside one spadeful from each bag, mix together the separate spadefuls, and from the mixture take about one pound as a sample.

If the fertiliser is in bulk, mix together portions taken from the different parts, and draw the sample from the mixture.

Directions for Taking Samples of Water.

All samples should be sent in glass bottles. Stoneware jars are to be avoided. The bottles should preferably be provided with glass stoppers; if corks are used, they must be new and well washed previously in pure water.

In sampling a stream or tank, before taking the samples rinse out the bottle several times with water, taking care to avoid the introduction of mud or sediment.

Before taking a sample of water from a pipe, allow the water to run through it for a few minutes at full pressure.

In all cases, before the sample is taken, always rinse out the bottle several times with the water to be sampled.

Quantity to be taken: 1 gallon.

Directions for Taking Samples of Milk and Cream for Butter-Fat Determinations.

The bulk from which the sample is to be drawn should be first poured two or three times from one vessel to another, and about half-a-pint forwarded for examination.

If it is impossible to deliver the sample in a fresh condition, introduce into each sample bottle about as much of the following preservatives as can be held upon a threepenny piece:—Borax, boric acid or salicylic acid; stating which preservative has been used.

All bottles used must have been previously cleansed with boiling water.

Charges for Dipping Cattle at Government Dipping Tanks.

A charge of 1d. per head is made in respect of all cattle dipped at Government dipping tanks.

Unweaned calves will be dipped free of charge.

Payment may be made in cash or by means of books of coupons at £1, 10/- and 2/6, which can be obtained from Civil Commissioners, Native Commissioners, or through all Veterinary Surgeons and Cattle Inspectors.

The tanks to which these provisions at present apply are the following:—

Salisbury (3), Bulawayo (3), Umtali, Penhalonga, Melsetter, Marandellas, Macheke, Mazoe, Lomagundi, Hartley, Gwelo, Selukwe, Enkeldoorn, Victoria, Gwanda, Gatooma, Que Que, Umvuma, Kimberley Reefs.

Lectures for Farmers

The services of certain of the officers of the Department of Agriculture and the Veterinary Department are available for purposes of delivering lectures on subjects upon which they have special knowledge. As far as practicable, lectures will be accompanied by demonstrations at the time or subsequently in the field. Owing to the many calls on the time of the staff and the exigencies of their duties, alternative dates are desirable in order to avoid disappointment. The following topics are

offered as examples of subjects that may be dealt with in this manner, but the suggestion of other themes is invited.

Agriculture.—Maize growing; Maize selection and maintenance of the breeding plot; Points of maize and maize judging, with demonstrations; Utilisation of granite vlei soils; Ground nut culture; Rotation crops for home use and for sale; Veld improvement by winter grasses; Production of foodstuffs for the mines; Ensilage; Fungoid diseases of maize and wheat; Wheat, oats and lucerne under irrigation; The prospects of cotton culture in Southern Rhodesia.

Veterinary Hygiene.—Detection and prevention of disease; The care of live stock.

Live Stock.—Judging of cattle according to breeds, and for beef, milk and draught; feeding and kraaling of live stock; general principles of cattle breeding; management of imported stock; grading up of native or local stock with pure bred bulls.

Dairying.—Home butter-making; building and equipment of a farm dairy; handling and marketing of milk; packing and marketing of butter; construction of cow houses.

Swine Husbandry.—Breeding and feeding of swine; some suggestions for the production of first-class bacon pigs; construction of piggeries at moderate cost.

Chemistry.—The principles of soil fertility; the principles of manuring; the value of lime in agriculture; chemistry of milk and its products (accompanied by demonstrations in milk-testing).

Entomology.—Economic entomology on the farm; the role of insects and their allies in the transmission of disease; scale insects and fruit trees and methods for their control; insect pests and maize; enemies of the potato, insect and fungus; the value and objects of plant import and nursery regulations.

Irrigation.—Methods of applying water to land for irrigation; the measurement of water in connection with irrigation; canal irrigation; storage reservoirs; hints on the selection of sites and on the design of earthen and other dams; irrigation by pumping, with notes on the selection of plants.

Enquiries and invitations should in the first instance be addressed to the Director of Agriculture, Salisbury.

Botanical Specimens for Identification.

In all cases where a botanical identification is required it is of the utmost importance that the specimens reach the Department of Agriculture in a thoroughly dry condition, free from mildew, and intact, that is not broken in pieces. Whenever possible specimens should comprise main stem or small branch, leaves, flowers, seed vessels and roots and bulbs, though these need not necessarily be on the same plant.

The colour of the flowers and the general form of the plant should be preserved by pressing and drying between two sheets of blotting paper or newspaper. Ordinary plants not excessively succulent can be dried sufficiently in three days, provided the drying papers are changed every day. A heavy weight should be placed on the specimens in order to press them flat.

Correspondents are asked to supply the following particulars as far as possible:—

(a) height and general appearance of plant or tree;
(b) class of soil on which found;
(c) locality and altitude;
(d) supposed use or properties.

It is advised that specimens be packed between two sheets of cardboard or thin wood, since in this way they will travel long distances without fear of injury.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only:—

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultural Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 300. The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 126. Turkish Tobacco.
No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. Tobacco Culture (Virginia)—Harvesting and Curing.

No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 251. Cultural Notes on Onions, by J. A. T. Walters, B.A.
No. 252. Cultural Notes on Buckwheat, by J. A. T. Walters, B.A.
No. 253. Wheat Production in Southern Rhodesia.
No. 258. Winter Wheat, by J. A. T. Walters, B.A.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworn, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.
No. 261. Turnip Sawfly, by R. W. Jack, F.E.S.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.

No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.

No. 53. Animals Diseases Consolidation Ordinance, 1904.

No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.

No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.

No. 95. Oestrus-ovis in Sheep, by Alec King.

No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.

No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.

No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.

No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.

No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.

No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.

No. 223. A Note on Contagious Abortion, by Ll. E. W. Bevan, Government Veterinary Bacteriologist.

LIVE STOCK.

No. 96. Swine Breeds and Breeding of, by Loudon M. Douglas, F.R.S.E.

No. 145. Prospects for Importation of Cattle from Australia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 161. Notes on Cattle Breeding, Part III., by R. C. Simmons.

No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.

No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R. C. Simmons.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.

No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.

No. 242. Construction of Dipping Tanks (Revised).

No. 243. Shedding for Milch Cows, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.

No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.

No. 134. Plans and Specifications for Flue Curing Tobacco Barns.

No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.

No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.

No. 157. Hints on Brickmaking, by G. T. Dyke.

No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.
No. 183. The Rainy Season in Southern Rhodesia, by the Rev. E. Goetz, S.J.
No. 184 Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.
No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.
No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.
No. 199. Eucalypts for the Farm, by J. J. Boocock.
No. 205. Home Butter Making, by R. C. Simmons.
No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
No. 213. Hydraulic Rams, by W. Martin Watt.
No. 217. Windbreaks and Hedges, by F. B. Willoughby.
No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 226. Classification of Clouds.
No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.
No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.
No. 237. The Analysis of Agricultural Products, Soils, Water, etc.
No. 241. Hints on Cement Concrete, by W. M. Watt.
No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.
No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist
No. 254. Hints on Explosives, by W. M. Watt.
No. 255. Pound Fees.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 257. Maize Grading, by J. A. T. Walters, B.A.
No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 260. Rhodesian Farm Orchard, by A. G. Turner.
Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.
Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.
Game Law: Summary of.
Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Employment on Farms.

The Department of Agriculture receives numerous enquiries from persons of varied attainments, age and financial position for openings on farms, as managers, assistants and learners, requiring remuneration on corresponding scales, or willing to give services in return for keep.

In order that work may be found for the above and needs of farmers met, applications are invited from both employers and persons seeking employment. Applications are also invited from artisans, such as masons, bricklayers, carpenters, fencers, well sinkers, concrete workers, and the like who may desire work on farms. In cases where employers have obtained the labour they require, or applicants for employment have found work, it is requested that notification be at once sent to the Department of Agriculture, in order that unnecessary correspondence be avoided.

Replies to the following applications should be addressed to the initials of the advertisers, c/o Director of Agriculture, who will forward the letter to the party referred to.

Note.—The following advertisements will not be repeated unless the advertisers inform us they wish them to be continued:—

SITUATIONS WANTED.

W. U. T.—*Poultry Management.*—Wanted by wife of farmer now on active service the care of poultry on shares or salary. Thoroughly competent and experienced.

Government Notices

No. 21 of 1917.] [19th January, 1917.

REGULATIONS FOR CONTROLLING THE MOVEMENT OF CATTLE.

1. UNDER and by virtue of the powers vested in him by the "Animals Diseases Consolidation Ordinance, 1904," His Honour the Administrator has been pleased to cancel and withdraw Government Notices Nos. 50 and 189 of 1912, 329 and 383 of 1914 and 259 and 320 of 1916, and to make the following provisions in lieu thereof; provided, however, that areas of infection and guard areas fixed under the terms of Government Notice No. 50 of 1912 shall be areas of infection and guard areas for the purposes of these regulations.

2. The various districts of Southern Rhodesia are hereby declared infected for the purposes of section 5 (2) of the aforesaid Ordinance, and, save as hereinafter set out, all movement of cattle within the said districts is prohibited until further notice.

3. The following shall be regarded as places within the boundaries of which the movement of cattle may be allowed without special permission :—

(a) Single farm.

(b) An area occupied by an owner or lessee, under one management, comprising contiguous farms and situated within an area fixed under section 9 hereof. The mere possession by an owner or lessee of grazing rights over a contiguous farm or farms shall not constitute occupation of such farm or farms.

(c) An area the property of one owner.

(d) For grazing purposes, an area within a radius of four miles of native kraals situated on unalienated land or in reserves, save and in so far as such area includes any private land.

The sites of such kraals shall be deemed to be the places where they are situated at the date of promulgation of these regulations.

(e) An area under the management or control of any Municipality, Sanitary Board or Village Management Board.

4. Notwithstanding the provisions of the last preceding section or of section 9 hereof, the Chief Inspector may, on the outbreak of disease or for such other cause as may be deemed expedient, direct the isolation or quarantine of cattle on a limited area of the aforesaid places.

5. The movement of cattle from place to place may be permitted under the special permission, in writing, of the Controller of Stock, the Chief Inspector, Inspector, Sub-Inspector or other officer or person duly authorised by the Administrator to grant such permission.

6. No permission as aforesaid shall permit the movement of cattle—

(a) Without the written consent of the owners, occupiers or managers of occupied land, and, in the case of native reserves, of the Native Commissioner of the district over which land or reserve such cattle will pass, whether along roads or otherwise; provided, however, that refusal to grant such consent shall be in writing, and provided further that if the Controller of Stock or the Chief Inspector shall consider that such consent is withheld without good and sufficient cause he may permit of movement without such consent.

If any such person mentioned above refuse to give consent or to state a reason for refusing to do so, in writing, no valid objection shall be deemed to exist, and movement may be permitted without such written consent.

(b) Through or to an area without the consent of the Cattle Inspector in charge of such area.

7. Cattle moved to any centre for slaughter under the provisions of these or any other regulations shall, on arrival, be immediately taken to such quarantine area (if any) as is provided for the purpose.

8. Cattle admitted to a quarantine area, in terms of the last preceding section, shall be slaughtered within twenty-one days of the date of admission, and shall not be permitted to leave the same except for the purpose of being slaughtered at the appointed abattoir, and if found outside such area, except for the said purpose, may be destroyed on the order of the Controller of Stock or the Chief Inspector; provided, however, that the Chief Inspector may allow the removal of cattle from such area under such conditions as he may prescribe.

9. The movement of cattle in use for draught purposes may be permitted under the provisions of sections 5 and 6 hereof within the boundaries of areas fixed from time to time by the Administrator; provided, however, that permits issued in respect of such movements may authorise the use of such cattle over defined roads for specified periods.

10. All cattle used for draught purposes, except in the areas defined by section 3, sub-sections (a), (b) and (c), shall be clearly and distinctly branded with the registered brand of the owner.

11. All wagons or other vehicles drawn by cattle, in terms of the preceding sections, shall have the owner's name and address legibly and permanently inscribed on the right side thereof.

12. Whenever the owner, occupier or manager of a farm shall adopt means of cleansing cattle running thereon, either by spraying, dipping or by any other method, the Chief Inspector may order any natives or other persons having cattle on the same farm to cleanse such cattle, and the Native Commissioner of the district within which the farm is situated may enter into an arrangement with the native owners of cattle to cleanse such cattle at a charge to be mutually agreed upon between the said owner, occupier or manager and the said native owners.

13. All permits for the removal of cattle issued under the provisions of these regulations shall specify legibly and clearly on the face thereof the place from and to which such cattle may be removed, the route by which they shall travel, the number of such cattle, the time allowed for the journey, and such other particulars and conditions as it may be deemed expedient to provide.

14. No permit issued for the movement of cattle shall be taken to authorise any trespass in connection with such movement.

15. Notwithstanding the provisions of these regulations, it shall not be lawful for any owner of cattle to allow any such cattle to be on any road, public outspan, commonage, or any property other than that of the owner, unless they are free from ticks. Any beast having ten or more ticks on it shall not be considered free from ticks.

16. The following provisions shall apply to areas infected with African Coast Fever.

17. On the outbreak or suspected outbreak of disease the Administrator may declare an area of infection around and embracing the place of outbreak or suspected outbreak, and a further area or areas around such area of infection as a guard area, whereupon all movement of cattle into and from place to place within such area or areas shall be immediately suspended, except as is hereinafter provided.

(1) In areas of infection and guard areas :—

(a) Cattle in transit by rail may be moved through such area.

(b) Cattle from beyond the borders of Southern Rhodesia may be detrained within such area or areas *en route* to destination for the purpose of being fed or watered or transferred to another truck.

(c) The Chief Inspector may, under such safeguards as he deems expedient, allow cattle to be brought into and thereafter leave any such area for a point outside thereof: provided that they are brought in by rail for the purposes of inoculation or *en route* to their destination.

(d) Cattle for *bona fide* farming, dairy and slaughter purposes may be moved into such area or areas by permission of the Chief Inspector and under such conditions as he may impose.

(2) In guard areas only:—

Cattle may be moved into and from place to place within such area under the conditions of section 6 hereof.

18. A permit for a terminal movement of cattle into an infected or guard area, or from one place to another in a guard area, shall authorise the drawing of a wagon or other vehicle by such cattle.

19. The removal of green forage, hay, fodder, bedding, reeds, manure or of such other articles as may reasonably be supposed capable of conveying infection, shall be prohibited from areas of infection, save and except with the special permission of the Administrator.

20. Every person within an area of infection or guard area, or within such further area as may be specified by Government Notice, owning or in charge of cattle, shall, upon the death or slaughter because of disease, suspected disease or accident of any such cattle, immediately report such occurrence through the nearest Cattle Inspector, Native Commissioner or Police Officer to the District Veterinary Surgeon.

21. In areas of infection no cattle shall be destroyed and no *post-mortem* examination shall be held on any cattle without the consent of an Inspector or Sub-Inspector.

22. Notwithstanding the provisions of these regulations, it shall be competent for the Chief Inspector to authorise and direct the movement of cattle—

(1) for the purpose of isolating, dipping, quarantine or any other such objects as may be deemed necessary to prevent or suppress an outbreak of disease:

(2) for the purpose of obtaining food and water;

at his discretion and under such conditions as he may prescribe.

23. Whenever an area shall have been declared an area of infection or guard area, any person who shall by his own act or neglect or that of his herds allow any cattle to stray or be otherwise removed, except as provided for in these regulations, from any one place within such area to another place, or from a place outside of to a place within such area, shall be guilty of an offence against these regulations.

24. In all areas of infection and guard areas, sheep and goats shall be dipped at such periods as may be directed by the Chief Inspector.

25. Any person contravening the provisions of these regulations or the conditions set out in permits issued thereunder, shall, where no higher penalty has been by the said Ordinance or any other law provided, be liable in respect of each offence to a fine not exceeding £20, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

No. 178 of 1917.] [18th May, 1917.

HIS Honour the Administrator in Council has been pleased to approve of the subjoined regulations with respect to the dipping of cattle.

In areas where the dipping of cattle is compulsory under the provisions

of the "Animals Diseases Consolidation Ordinance, 1904," or the "Compulsory Dipping Ordinance, 1914," any arsenical preparation the arsenical content whereof is not less than that of the arsenical solutions prescribed below for dipping at intervals of three, seven and fourteen days shall be an approved dip.

For three-day dipping.—A solution containing the equivalent of .08 per cent. arsenious oxide.

For seven-day dipping.—A solution containing the equivalent of .16 per cent. arsenious oxide.

For fourteen-day dipping.—A solution containing the equivalent of .24 per cent. arsenious oxide.

AFRICAN COAST FEVER.

Areas of infection and guard areas declared in terms of Government Notice No. 50 of 1912.

Melsetter and Umtali Native Districts.

(a) *Areas of Infection.*

The farms Enhoek, Wolvedraai, Joppa, Ravenswood, Rookwood, Roslyn, Cecilton, Woodstock, Ostend, Diepfontein, Moosgwe, Lombard's Rust, Wolverhampton, Helvetia, Thabanchu, Johannes' Rust, Geluk, Morgensen, Kronstad, Jameson, The Ranche, Rocklands, Weltevreden and Umzila.

(b) *Guard Areas.*

The native district of Melsetter, and that portion of the native district of Umtali lying south of a line drawn from the junction of the Odzi and Impodsi Rivers, up the Impodsi River to its junction with the Shetora River, and up that river to the farm Butler North, thence along the northern boundary of that farm and the northern and eastern boundaries of the farm Banti North to the Portuguese border.

Gwelo Native District.

(a) *Areas of Infection.*

The farms Riverbend, Sunbury, Cross Roads, Wegdraai and Reserve.

(b) *Guard Area.*

Bounded by a line drawn from the Gwelo River along the northern boundary of the Main Belt Block to the farm Argyle; thence along the western boundaries of Argyle and Roscobie and from the north-west beacon of the latter in a direct line to the south-west beacon of Summerview: thence along the southern boundaries of Summerview, Hopeton, Leith Hill, Kilkenny, Borisvale and Amiens to the Sebakwe River; thence up the Sebakwe River to the farm Avoca: thence along the western boundary of Avoca, the north-western and south-western boundaries of the Central Estates to the farm Irving; thence along the western boundaries of Irving and Mull to the railway line; thence along the latter to the boundary of the Gwelo Commonage: thence along the easterly and northerly boundaries of the latter to the Gwelo River; thence down this river to the point first named.

Salisbury Native District.

(a) *Area of Infection.*

The farm Sternblick.

(b) *Guard Area.*

The farms Gletwyn, Glen Lorne, Rumbavu Park, those portions of the original Borrowdale Estate known as Greystone, Helenvale, Carrickereagh and Luna, and the remainder of the original Borrowdale Estate, excluding Hatcliffe, Hatcliffe Extension and Pomona East.

MAZOE NATIVE DISTRICT.

(a) *Area of Infection.*

The farm Welbeck.

(b) *Guard Area.*

Sub-divisions 9 and 10 of the Belford Estate, the farms Yarrowdale, Whitfield, Foyle, Ibima, Igami, Tjilakwe, Bernheim, Mpungwe, the unalienated land around Mazoe Post Office and the 100-acre lots Mazoe Junction, Lemon Pool, Willows, Camp Hill, Poort View, Tatagura and Tatagura Extension.

NATIVE DISTRICTS OF SALISBURY AND HARTLEY.

(a) *Area of Infection.*

The farm Waterfall, including sub-divisions.

(b) *Guard Area.*

An area bounded by and including the following farms :—Porta, Kilworth, Saffron Walden, Sunnyside, Forest Reserve, Sigaro, Mayfield, Patterson, Mguta, Ingleborough, Calgary, Teviotdale, Pomona, Rietfontein, Colne Valley, The Grange, Chikurubi, Manresa, Donnybrook, Ventersburg, Adelaide, Deanesbrook, Buena Vista, Dunedin, Seki Reserve, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Duiker, Sherwood, Idaho and Reserve.

MTOKO, MREWA AND MARANDELLAS NATIVE DISTRICTS.

(a) *Area of Infection.*

The Mangwendi and Uzumba reserves, in the native district of Mrewa.

(b) *Guard Areas.*

1. The native district of Mrewa, excluding the Mangwendi and Uzumba native reserves.

2. An area in the native districts of Marandellas and Makoni bounded by and including the farms Train, Hornsey, Isleham, Anwa, Soft, Showers, Gongwe, Tiller, Highlands, Allen, Holton Estate, Reserve, White Gombola, Bonn, Calne, Wilton, The Cave, Mere, Naples, Machiki, Eldorado, Percyvale Estate and Monte Cassino.

3. The native district of Mtoko, excluding the main road between Mtoko and the Makaha valley.

Note.—The above areas were declared under the following Government Notices :—Of 1916, Nos. 213, 275, 396 and 405; of 1917, Nos. 12, 159, 160 and 173.

No. 179 of 1917.] [18th May, 1917.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—at Waterfall farm, in the native district of Salisbury, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area in the native district of Hartley bounded by the Hunyani River and by and including the following farms :—Longlands, Braemar, Dunottar, Cawdor, Tantallon, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Duiker, Sherwood, Idaho, Reserve.

Nos. 381 of 1914 and 200 and 266 of 1916.]

COMPULSORY DIPPING.

UNDER and by virtue of the powers vested in me by section 7 of the "Compulsory Dipping Ordinance, 1914," I hereby declare that the provisions of that Ordinance shall be applied in respect of cattle within the following areas from the date of issue of these Notices, dipping to take place at such intervals as the Chief Veterinary Surgeon shall direct.

The areas under the control of the Municipalities of Salisbury, Bulawayo, Gwelo and Umtali, the Sanitary Boards at Gatooma and Victoria, and the Village Management Boards at Que Que, Melsetter, Penhalonga, Marandellas, Hartley, Enkeldoorn, Avondale, Umvuma, Selukwe, Gwanda, Blinkwater, Plumtree and Rusape.

Further, I do hereby declare that a charge of one penny per head will be made in respect of all cattle dipped at Government dipping tanks, except unweaned calves, for which no charge will be made; and one penny in respect of all horses, mules and donkeys, and ½d. in respect of all sheep.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 7 of the "Animals Diseases Consolidation Ordinance, 1904."

GWELO.

An area comprising the following farms:—Main Belt Block farms east of the Long Valley Spruit, Erin, Doon, Krom River, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathfillan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Que and Bembezaan.

MREWA

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

SOUTH MELSETTER.

All surveyed farms in the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge and Biriwiri, including the Ingorima Reserves and Mafusi Reserve, and excluding the farms Umzelezwe, Nyagadzi, Mhungura, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera.

NORTH MELSETTER AND SOUTH UMTALI.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri, and the Nyanyadzi River; and that portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

SALISBURY AND MAZOE.

An area in the Salisbury and Mazoe native districts bounded by and including the following farms:—Lilfordia, Saffron Waldon, Kilworth, Porta, Reserve, Clement's Plot, Warwickshire, Oatlands, Amalinda, The Rest, Langford, Saturday Retreat, Reserve, Odar, Stoneridge, Longlands, Seki Native Reserve, Dunstan Estate, Banana Grove, Mayfair, Galway Estate,

Sebastopol, Gardiner, Gilnockie, Cromlet, Learig, Reserve, Meadows, Mount Shannon, Halstead, western portion of Chindamora Reserve, Pote, Valeria, Spelonken, Arnold's, Smithfield, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal, Mooi Leegte, Reserve, Bitton, Syston, The Lily and Killiemore.

HARTLEY.

An area in the native district of Hartley bounded by the Hunyani River and by and including the following farms:—Longlands, Braemar, Dunottar, Cawdor, Tantallon, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Duiker, Sherwood, Idaho, Reserve.

Note.—These areas were declared under the following Government Notices:—Of 1915, Nos. 206, 318 and 355; of 1916, Nos. 215 and 226; of 1917, No. 180.

COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 2 of the "Compulsory Dipping Ordinance, 1914."

ENTERPRISE—SALISBURY.

An area bounded by and including the following farms:—Halstead, Mount Shannon, The Meadows, Ivordale, Ivanhoe, Oribi, Colga, Neptune Mashona Kop, Mashona Vlei, Vuta, Chinyika, Lonely Park, Grazeley Guernsey, adjoining vacant ground, Cromlet, Father Hartmann, Chisha washa, Stuhm, The Springs, The Grove and Umritsur.

MELSETTER AND UMTALI.

All surveyed farms and the Ingorima and Mafusi reserves, in the native district of Melsetter, excluding Umzelezwe, Nyagadzi, Mhunguru, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera; and including the following farms in the native district of Umtali: Tom's Hope West, Steynstroom, Thabanchu, Penkridge, Macandrews, Cronley and Lisnacloon.

SALISBURY, MAZOE AND HARTLEY.

An area bounded by and including the following farms:—St. Mary's, Stoneridge, Odar, Reserve, Saturday Retreat, Chizanza, Suum Cuique, Arbroath, Langford, The Rest, Amalinda, Oatlands, Warwickshire, Clement's Plot, Reserve, Porta, Lyndhurst, Riverside, Herren Hausen, Lilfordia, Killiemore, The Lily, Ballineety, Fairview, Spa, Passaford, Springvale, Mbebi, Umsasa, Great B, Christon Bank, St. Gerera, Willesden Farm, Borrowdale Estate, Luna, Glen Lorne, Gletwyn, Sternblick, Mauresa, Caledonia, Sebastopol, Galway Estate, Mayfair, Nalire Reserve, Buena Vista and Seki Reserve.

MAKWIRO—HARTLEY.

An area bounded by and including the following farms:—Umfulia, Dorothy Hill, vacant land, Seigneury Reserve, Zimbo Junction, Serui Drift, Strathmore, Scotsdale, Cape Boys' Reserve, Railway Farm No. 22, vacant land between Railway Farm No. 21 and Spencer, Spencer, Railway Farm No. 23, Woodsgift, Railway Farm No. 25, Southwood, Northwood, Niklot, Rothwell Extension, Hunyani Estate, Hunyani Estate No. 2, Stanhope, Cromdale, Garthnor, Serui, Curlewood, Cotswold and vacant land and farms lying within a line from the most easterly beacon of Cotswold to the north-east beacon of Fort Martin, thence to the south-east beacon of Fort Martin and from there due south to the Umfuli River and down that river to the farm Umfulia.

MARANDELLAS AND SALISBURY.

An area bounded by and including the following farms:—Rakodsi, Longlands, Shepparton (portion of Lendy Estate), Progress, Rockery, Shortlands,

Rastenburg, Loquat Grove, Cornwall, Norfolk, Middlesex, Kent, Suffolk, Sussex, Rupture, Argosy, Weir, Inandu, Seaton, Rapture, Sunny Fountains, Mangwendi Mission, Retreat and Springvale.

SHAMVA—MAZOE.

An area bounded by and including the following farms:—The Carse, Burnleigh, Woodlands, Ceres, Murgwi, Zombi, Chewarika, Maienzi, Maxton, Lone Star Reserve No. 2, Richlands, M. E. D. Reserve, New Brixton, Dillon, Mullingar, Mumwi, Chipoli, Ellerslie, Wolley, Wapley, Lion's Den, and thence from the south-eastern beacon of Lion's Den up the Poorti River to the north-western beacon of The Carse.

RUSAPE—MAKONI.

An area bounded by and including the following farms:—The Willows, The Springs, Howick, Leeuw Poort, Highfield, Emerald, Kirkly Vale, Lawrencedale Estate, Chimbi, Notgotimyet, Diana, Inyagura, Cheira, Cheira Source, Invercargill, Wick, Makoni Reserve, Mount Zonga, Reserve, Inyamasanga, Windsorton, Manda, Zimati, Mount Tikwiri, Rocking Stone, Lesapi Falls, Recondite, Cheronga and Lesbury.

BINDURA—MAZOE.

An area bounded by and including the following farms:—Wiseacre, Erin, Pimento Park, Duiker Flat, Jesmond Deane, The Ridge, Malvern, Selwood, Marston, Nan Terra, Retreat, Nomansland, Vergenoeg, Caledon, Chiwaridza Reserve, Dengeni, Vredehoek, Arcadia, Hereford, The Vale, Bonny, Wild Dog Valley, Atherstone, Kingston, Hildadale, Cardiff and Poorti Outspan.

HEADLANDS AREA, MAKONI.

An area bounded by the Nyagadzi River from where it intersects the northern boundary of Fairfield Estate, down this river to the Chikore Reserve and along the south-west boundary of this reserve to the Mwaruzi River, and down this river to the Inyongombi River; thence in a southerly direction up this river to the north-east beacon of Rathcline; thence along the northern and western boundaries of Rathcline and western boundary of Bannockburn North, the southern boundaries of Inyati Block and Yorkshire Estate to a point directly opposite to the most northerly beacon of De Vos; thence by and including the farms De Vos, Lone Kop, Moodiesville, Reserve, Netzewa, Fischerville, Wakefield, Urmston; thence up the Macheke River to the southern beacon of Monte Cassino; thence along the southern and eastern boundaries of that farm and from its most northern beacon in a direct line to the south-western beacon of Changwe Ranche No. 1; thence along the northern boundary of Fairfield Estate to the first-named point.

UMVUMA AREA, CHILIMANZI AND CHARTER.

An area bounded by and including the following farms:—Pela, Pansi, Ensimoen, Richmond, Vosges, Kombisa, Kanya, Blackwood, Tshamamvura, Smithvale, Grootfontein, Mtao, Aldebey, Welstead, Lovedale, Central Estates, Sebakwe, Xmas and Bushy Park.

MATABELELAND.

That portion of Matabeleland lying west of a line drawn from a point where the Gwaai River enters the Zambesi River; thence up the former and the Shangani River to the northern boundary of the Karna Block; thence following the northern and eastern boundaries of this block to the Karna River; thence up this river and the northern and eastern boundaries of the Shangani Native Reserve to the Shangani River; thence up this river to the northern boundary of Kenilworth Block; thence by and including Kenilworth Block, North Shangani Farm, Baltimore, Lynes Farm, Joseph Block, Bulawayo Syndicate Block, Mbati Tiabetsi Block, Shangani Reserve and Reserve, Battle Farm, Leechdale, Thornville, Dandasi, Ripley, Bon Accord, Liscard, Belmont, Forfar, De Beers Block and Torwood Lee;

thence in a northerly direction along the northern boundary of Belingwe Reserve No. 1 to the Lundi River; thence down this river to a point where the old pioneer road crosses it; thence down this road to the Nuanetsi River, and down this river to the northern boundary of Wanezi Block; thence along the eastern and southern boundaries of this block and Jopempi Block to a point where it is crossed by the road from Mazunga to Messina; thence along the eastern boundary of this road to the Limpopo River.

HARTLEY—GATOOMA—BATTLEFIELDS.

An area bounded on the north by the Umfuli River from its junction with the Umniati River to its junction with the Doronanga River; on the east by and including the Mondoro Native Reserve and the British South Africa Company's Rhodesdale Ranche; on the south by and including the Rhodesdale Ranche; on the west by and including the Rhodesdale Ranche to the Sebakwe River; thence down that river to its junction with the Umniati River, and down that river to its junction with the Umfuli River.

VICTORIA.

From the junction of the Ngesi and Shasha Rivers up the latter river to the southern boundary of the Gurajena Native Reserve; thence along the southern boundaries of this reserve and the farms Drewton and Clarkdell to the Makoholi River; thence down this river to the south-west corner of the Nyamarundu Native Reserve, and along the southern boundaries of this reserve and the Zimutu Reserve to the Umyambi River, and down this river to the Popotekwe River; thence eastwards along the boundaries of the Victoria and Ndanga native districts to the Chishire River and up this river to its headwaters; thence in a straight line to Mount Bungu; thence along the north-western and western boundaries of the Makouri Native Reserve to the farm Allendale; thence by and including the farms Allendale, Cardigan, Glendhu, Iram, Vlakfontein, Niekerk's Rust, Iwade, Histonhurst, Arawe, Cheveden, Inyoni, Kelvingrove, Erichsthal, Oatlands, The Retreat, Morgenster, Mzero and Tentergate to the south-western beacon of the latter farm; thence in a north-westerly direction to a point on the Pioneer Column Road and southwards along this road to the Tokwe River; thence up this river and the Shasha River to the starting point.

Note.—These areas were declared under the following Government Notices:—Of 1915, Nos. 402 and 423; of 1916, Nos. 21, 22, 98, 126, 159, 208, 370, 373 and 460; of 1917, Nos. 42, 45, 65 and 108.

No. 146 of 1917.] [20th April, 1917

COMPULSORY DIPPING OF CATTLE: UMVUKWE AREA, MAZOE DISTRICT.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 22nd June, 1917.

Description of Area.

An area bounded by and including the following farms:—Long Ranche, Umsengedsi, Stockbury, Pembi Junction, Galloway, Stockwell, Ealing, Umvukwe Flats, Brotherton, Mondynes, Omeath, Ruorka Ranche, The Three Sisters, Msorodoni, Wengi River Estate, Umvurodonna and Nyachura; thence from the south-east beacon of Nyachura along the western boundary of the Chiweshe and Negombo Reserve to the Chitonzwe Hill, and from thence direct to the north-east beacon of the farm Long Ranche.

No. 157 of 1917.] [4th May, 1917.

COMPULSORY DIPPING OF CATTLE: BROMLEY AREA. SALISBURY AND MARANDELLAS DISTRICTS.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 6th July, 1917.

Description of Area.

An area bounded by and including the following farms:—Nyambuya, Waterford, Essexdale, Roraima, Peddie, Anwick, Hedon, Great Bromley Estate, Ardlussa, Wychwood, Glen Avon, Dunstan Estate, Dunedin, Banana Grove, Fordyce, The Glebe, James, Gardiner, Gilnockie, Retreat, Bellevue, Belmont, Belvedore, Rochester, Northfield and the Kunzwi Reserve.

No. 158 of 1917.] [4th May, 1917.

COMPULSORY DIPPING OF CATTLE: GWELO—QUE QUE AREA.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 6th July, 1917.

Description of Area.

The Gwelo native district, excluding that portion already included in Hartley-Gatooma-Battlefields area published under Government Notice No. 45 of 1917.

No. 22 of 1917.] [19th January, 1917.

IMPORTATION OF CATTLE.

HIS Honour the Administrator has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notices Nos. 186 of 1914, 169 and 342 of 1916, and, notwithstanding any general restrictions on the importation of cattle, to make the following provision for the introduction of certain classes of cattle from the Cape Province, the Orange Free State and the Transvaal.

1. The following classes of cattle may be imported direct from farms or stock sales approved of by the Chief Inspector in the Cape Province, the Orange Free State or the Transvaal:—

(1) cattle with not more than two permanent central incisor teeth;

(2) cattle, irrespective of age, if entered in a South African Stud Book or appendix thereto, or cattle entered in a Stud Book which were originally imported from Great Britain or Ireland, the United States of America or the Kingdom of the Netherlands.

2. No importation as aforesaid shall be permitted until application for permission to import shall have been made, accompanied by a certificate in the form of the Annexure "A" or "B" as the case may be, and until a permit to import shall have been issued by the Chief Inspector, which may contain such conditions as shall from time to time appear expedient.

3. The importation of cattle from Great Britain and Ireland, the United States of America and the Kingdom of the Netherlands may be permitted under the following terms and conditions :—

(1) a permit shall be required from the Chief Inspector, which may contain such conditions as shall from time to time appear expedient;

(2) importations shall be through and direct from the ports of Cape town or Port Elizabeth.

4. All importations shall be by rail, and for the purposes of importation Bulawayo shall be the port of entry.

5. All cattle imported in terms of these regulations shall, on arrival at Bulawayo, Salisbury or Umtali, be submitted to such examination or tests as the Chief Inspector may direct. If such examination or tests disclose the existence of any destructive disease, the cattle shall be immediately destroyed and the carcases thereof disposed of in such a manner as a Government Veterinary Surgeon may authorise or require. The Chief Inspector may permit of the age restriction and the tests aforesaid being dispensed with in the case of cattle in transit by rail to any place beyond the borders of Southern Rhodesia.

6. All expenses or losses incident to quarantine, examination, testing or destruction as aforesaid shall be borne by the owner of the cattle.

7. Any person introducing cattle in contravention of these regulations or failing to comply with any of the conditions attached to permits to import, or furnishing applications, declarations or other necessary documents known to be false in any material particular, or failing to comply with all lawful directions as to quarantine, examination, testing, destruction or disposal of carcases, shall be liable to a fine not exceeding £20 for each animal in respect of which such offence shall have been committed, and in default of payment to imprisonment with or without hard labour for any period not exceeding six months, unless higher or greater penalties shall have been provided for such offences by the "Animals Diseases Consolidation Ordinance, 1904"; provided, however, that the penalties imposed by these regulations shall not exempt any cattle from destruction in terms of the aforesaid Ordinance.

Southern Rhodesia.

ANNEXURE "A."

IMPORTATION OF CATTLE

entered in a South African Stud Book or appendix thereto, or imported originally from Great Britain and Ireland, the United States of America and the Netherlands.

I.....residing on the farm.....
in the district of.....in the Union of South Africa, do solemnly and sincerely declare that the.....(number in writing) animals enumerated below have been in my possession from.....(date), and that lung-sickness has not existed amongst any of my cattle since that date, and that none of such animals is prevented by any regulations or agreement in respect of freight from being exported from the Union of South Africa.

Description of Animals.

Breed.	Sex, name and number in Stud Book.	Country of origin.
.....		
.....		
.....		
.....		
.....		

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of..... 19 before me,

.....

Resident Magistrate for the district of

.....

Names of former owners.....

.....

.....

Purchaser's name

Place in Southern Rhodesia to which animals are being sent.....

Southern Rhodesia.

ANNEXURE "B."

IMPORTATION OF CATTLE

other than cattle originally imported from overseas and cattle entered in a South African Stud Book.

I.....residing on the farm..... in the district of.....do solemnly and sincerely declare that the.....(number in writing) animals also enumerated below have been in my possession since birth, and that lung-sickness (contagious pleuro-pneumonia) has not existed amongst any of my cattle nor on my farm during the last four years, and that these animals have never been previously exposed for sale in any public market or stock fair.

Number of animals..... Bulls..... Heifers..... Breed.....

Seller's name and address.....

.....

Purchaser's name.....

Place in Southern Rhodesia to which animals are being sent.....

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of..... 19.....before me,

.....

Resident Magistrate for the district of

.....

IMPORTATION OF STOCK FROM THE PROVINCE OF THE CAPE OF GOOD HOPE.

WITH reference to Departmental Notice of 12th July, 1913, it is hereby notified that the said Notice is cancelled, and that from date hereof permits may be issued for the importation of cattle into Southern Rhodesia from all parts of the Province of the Cape of Good Hope with the exception of the following districts :—

Komgha, Stutterheim, Cathcart, Maclear, Indwe sub-division of Wodehouse, Queenstown (Gwatyu Ward only), Glen Grey, Elliot Slang River.

30th March, 1917.

No. 364 of 1914.] [27th August, 1914.

REGULATIONS GOVERNING IMPORTATION OF LIVE STOCK, ETC.

UNDER and by virtue of the powers vested in me by the "Animals Diseases Consolidation Ordinance, 1904," as amended from time to time, I

do hereby cancel the regulations published under Government Notices Nos. 295 and 394 of 1908; 38, 61 and 263 of 1909; and 60 of 1911 and 188 of 1912, 47 of 1913, and so much of any other regulations as may be repugnant to or inconsistent with the subjoined regulations, which are hereby declared to be of full force and effect.

1. The importation of the following animals from the respective countries or districts enumerated is prohibited, owing to the existence or supposed existence of destructive diseases affecting the said animals in the said countries :—

(1) All animals and dogs as defined by the aforesaid Ordinance from—

India,
Mauritius,
Persia,
British Burmah,
Assam,
China and bordering countries, including Korea,
French Indo-China,
Dutch East Indies,
Hong-Kong,
Federal Malay States,
The Philippines,
Zanzibar,

and all other countries where surra is known or suspected to exist.

(2) Pigs from the Union of South Africa, the Bechuanaland Protectorate, the Tati Concession, and other countries in which swine fever exists or is suspected to exist, subject, however, to the exceptions contained in the proviso to this section.

(3) Dogs from the territories of Northern Rhodesia and Portuguese East Africa, subject, however, to the exceptions in the proviso of this section.

(4) Sheep and goats from the districts of Albany, Alexandria, Bathurst, Bedford, East London, Fort Beaufort, Humansdorp, Jansenville, Kingwilliamstown, Komgha, Peddie, Somerset East, Stockenstroom, Uitenhage and Victoria East, in the Cape Province; the districts of Barberton, Lydenburg, Marico, Pretoria, Rustenburg, Waterberg and Zoutpansberg, in the Transvaal; Swaziland, Portuguese East Africa, Northern Rhodesia.

Provided, however—

(a) that the Chief Inspector may at his discretion permit the importation of pigs, sheep and goats from the above-mentioned places on production of a certificate signed by a duly authorised Government Veterinary Officer in the form of Schedule "A" attached hereto;

(b) that the importation of dogs required for scientific purposes only may be permitted from the places mentioned in sub-section (3) hereof, by the Chief Inspector, in writing, subject to such conditions as may be imposed by him;

(c) that dogs, sheep, goats and pigs from countries from which importation is permitted may be introduced *via* the port of Beira, provided that all such animals shall be transferred directly after disembarkation to the railway trucks at Beira, and conveyed thence to Umtali without leaving the said trucks.

2. The areas set out in Schedule "B" hereto are hereby appointed for the depasturing and quarantining of animals for slaughter in connection with the places therein mentioned.

3. The several districts of Southern Rhodesia are hereby declared to be an area infected with scab amongst sheep and goats, and the movement of all sheep and goats from any farm to beyond the limits thereof, or from their usual grazing ground within the limits of any town lands or native reserves to any other place, is prohibited, except under the written permit

of an Inspector or Sub-Inspector. Such permit shall set forth the number and description of animals to be moved, the route they shall travel, and the period for which the permit shall be in force. In cases where it may be necessary or desirable, the person to whom such permit is issued may be required to cause the animals referred to therein to be dipped before being moved.

4. The introduction of sheep and goats is prohibited except—

(a) as specially provided for by section 1 hereof;

(b) from places not mentioned in section 1, if accompanied by a certificate in the form set out in Schedule "C" hereof.

5. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by rail shall immediately report such arrival to the Veterinary Office at Salisbury, Bulawayo and Umtali respectively, and no such animal shall be detrained at any intermediate station without the written authority of a Government Veterinary Surgeon.

6. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by road shall immediately report such arrival at the Police Camp nearest to the place where such entry is made, and the officer in charge of such Police Camp shall immediately report to the Veterinary Department, which shall direct what steps are to be taken to test such animals with mallein, as in the following clause provided.

7. All horses, mules and donkeys, upon entering Southern Rhodesia, shall be tested with mallein, and the owner or person in charge of such animals shall in all respects carry out the lawful directions of the Inspector while such animals are being tested; provided that this regulation shall not apply to animals in transit through Southern Rhodesia which are not detrained *en route*.

8. Horses, mules and donkeys lawfully in this Territory, and required for purposes necessitating frequent crossing of the border, may be allowed to so cross on such terms as to registration, branding, testing and conditions as the Chief Veterinary Surgeon may from time to time deem expedient to prescribe.

9. An Inspector may direct the thorough cleansing and disinfecting of trucks which may be reasonably suspected of being sources of infection of any destructive disease, and may direct the destruction of truck fittings, fodder, excreta, or other matter or thing which may be reasonably calculated to convey such infection.

10. Any persons contravening the provisions of these regulations, or the instructions or directions given in terms of these regulations, shall be liable in respect of each offence to a penalty not exceeding twenty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months, unless where more or heavier penalties have by the aforesaid Ordinance, or by other regulations framed thereunder, been expressly provided.

SCHEDULE "A."

Certificate.

Issued under provisions of section 1, Government Notice No. 364 of 1914.

This is to certify that the animals enumerated below are, in my opinion, free from any destructive disease, including heartwater; and, to the best of my knowledge and belief, have not been in contact with any infected animals, nor come from, or through, a locality where any such disease is known to exist or has existed for twelve months from date hereof.

Date....., 19...

Place.....

.....

Signature of
Government Veterinary Surgeon.

Number and general description of animals :
.....Pigs, ...Sheep, ...Goats.

Place from which animals are to be sent :
.....

Owner's name and address :
.....
.....

Place in Southern Rhodesia to which it is desired to send the animals
.....

SCHEDULE "B."

Description of areas set apart for depasturing and quarantining of animals for slaughter.

Salisbury.—A fenced piece of land, 400 acres in extent, situated on the Makabusi River below Maggio's plot, within the Salisbury commonage and towards the southern boundary thereof.

Bulawayo.—That piece of fenced land situated on the Bulawayo commonage between the railway line, to the south, and the Solusi road, adjoining and to the south-west of the Government dipping tank, in extent 1,000 acres more or less.

Gwelo.—Starting from a point where the Ingwania road crosses the railway, along this road past the sanitary stables to a point a quarter of a mile west, thence in a line parallel with the railway to the Gwelo River, thence along the river to the commonage beacon No. 11, thence in a straight line to the Shamrock road where it is intersected by the Scout's Spruit, thence along the Shamrock road to where it joins the Main Street extension, thence along this to the railway line, and down this to the starting point.

Umtali.—A piece of fenced land situated on the old Darlington Farm section of the Umtali commonage.

Penhalonga.—A piece of fenced land situated on plot No. 2, Imbeza plots.

Selukwe.—A piece of fenced land, in extent about 300 acres, situated on the farm Sebanga and adjacent to the township of Selukwe.

SCHEDULE "C."

I, ... residing at
in the district of... in the.....
Colony, do solemnly and sincerely declare that the animals enumerated below are free from any contagious disease, including scab, and have not been in contact with any infected animals within six months from date hereof, and that, to the best of my knowledge and belief, such animals, in travelling to.....† station, will not come in contact with any animals amongst which scab or any other contagious disease exists.

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....
day of.....before me.

.....
Magistrate, Government Veterinary Surgeon, Scab Inspector, or Police Officer of district from which animals are being sent.

Number and general description of animals being sent.....
Owner's name and address.....
.....

Place in Southern Rhodesia to which animals are being sent.....

† Station within Colony of origin.

ISSUE OF PERMITS FOR THE REMOVAL OF STOCK.

IT is hereby notified for public information that His Honour the Administrator has approved of members of the British South Africa Police issuing permits for the removal of cattle, sheep and goats at the undermentioned stations when no Inspector or Sub-Inspector of Cattle is available :—

Nyamandhlovu.	Mphoeng's.
Gwanda.	Holi.
Plumtree.	Filabusi.
Fort Rixon.	Gwaai.
Belingwe.	Figtree.
Inyati.	Umvuma.
Fort Usher.	Que Que.
Mazunga.	Tuli.
Makwiro.	Sinoia.
Banket Junction.	Buhera.
Makaha.	Beatrice Mine.
Sipolilo.	Wedza.

No. 23 of 1917.] [19th January, 1917.

HIS Honour the Administrator has been pleased, under the provisions of section 5, sub-section (1) of the "Animals Diseases Consolidation Ordinance, 1904," to approve of the appointment of the persons named in the subjoined list as Cattle Rangers for the district of Hartley for the purposes of examining cattle permits, detaining cattle being irregularly moved, detaining cattle infested with ticks and supervising the dipping of cattle in areas under the provisions of the "Compulsory Dipping Ordinance, 1914 "

District.	Nominee.
Umsweswe	John William Banner, Umsweswe.
Eiffel Flats	Geoffrey Cotton Woodforde, Eiffel Flats.
Lydia	Reginald Heber Ullyett, Acorn Mine, Gatooma.
Golden Valley	John Mack, Golden Valley.
Shagari	Henry Fenwick Thompson, Shagari.
Umniati	Fred Morgan Linscott, Golden Valley.
Hartley Township	Dennis Handrick, Hartley.
Duchess Hill	Charles Edward Simpson, Concession Hill.
Gatooma—Hartley Road	Robert Appleton Sworder, Hartley.
South of Duchess Hill	William Muter Leggate, Hartley.
Old Hartley—Hartley Road	Frederick Percy Quinton, Hartley.

SUMMARY OF THE GAME LAWS.

Game is divided into three distinct classes, described as follows :—

(a) Birds and Small Buck.

(b) Bushbuck, Hartebeest, Impala, Lechwe, Pookoo, Roan and Sable Antelope, Sitatunga, Tsessebe, Waterbuck, and Wildebeest.

(c) Royal Game, which includes Eland, Elephant, Giraffe, Gemsbok, Hippopotamus, Inyala, Koodoo, Ostrich, Rhinoceros, Springbuck and Zebra.

The shooting season for Class "A" is as follows :—

In Mashonaland :

Birds from 1st May to 30th September.

Small Buck from 1st May to 31st October.

In Matabeleland :

Birds and Small Buck from 1st May to 31st October.

To shoot in Class "A" a licence costing £1 per annum is required. This entitles holders to hunt in both Provinces during the open season.

Class "B."—The season opens on 1st July and closes on 30th November in both Provinces. The licence fee is £25 for non-residents and £5 for persons having their domicile in Southern Rhodesia. This licence entitles the holder to shoot up to 15 head, which number may be increased to a total of 25 upon payment of a further sum of £15 in the one case and £5 in the other.

Class "C."—The Administrator may, if he is satisfied that the animals are actually required for scientific purposes, grant to the holder of a game licence permission to shoot or capture any of the species included in this Class. Such permit requires a £5 stamp. Applications in writing, together with proof of *bona-fides*, should be addressed to the Director of Agriculture.

Game for Farming Purposes.—Permits may be granted for the capture of Eland, Ostrich, Zebra or other animals for the purposes of breeding or farming. Such permits require a stamp of the value of £1 and remain in force for six months. Application, accompanied by a sworn declaration, should be made through the Director of Agriculture or the Civil Commissioner of the district.

Game Injuring Crops.—The occupier of any cultivated land or any person acting under the authority of such occupier, may at any time destroy game actually doing damage on such land.

Export of Game.—No living Game or the Eggs of any Game Birds may be exported beyond the limits of Southern Rhodesia without a written permit.

Shooting on Private Land.—A licence does not entitle the holder thereof to shoot on private land without the permission of the land-owner.

Farmers Shooting Game on their Farms.—By taking out a special £1 licence, farmers may at any time shoot any game on their land. "Game" does not include any birds, except ostriches.

Open Area.—The shooting or capturing of all classes of game with the exception of ostriches and other birds classified as game is permitted within the following area in the Hartley district until further notice :—

Hartley District.—From the railway bridge on the Umfuli River, thence north-westwards along the Umfuli River to where it joins the Umniati River, thence southwards along the Umniati River to where it joins the Umsweswe River, thence eastwards along the Umsweswe River up to the drift at the Lydia Mine, thence along the old road from Lydia Mine to Etna Mine and to Inez Mine, thence northwards along the road from Inez Mine to Hartley, thence in the direction of the railway bridge to the starting point on the Umfuli River.

The game specified may be shot in this area without a licence.

Protected Area.—All game is strictly preserved in the Urungwe Game Sanctuary as defined below :—

An area in the Lomagundi district, bounded as follows : On the north and west by the River Zambesi, starting at the point where the Lozenzi River joins the Zambesi, and following the course of the latter river to its junction with the Sanyati River; on the east by an imaginary line drawn from the junction of the Indurune and the Nyaodsa Rivers to the head-waters of the Lozenzi River, and thence along the course of the Lozenzi River to its junction with the Zambesi River; on the south by an imaginary line drawn due west from the point of junction of the Indurune and Nyaodsa to the Sanyati River, thence along the course of this river to where it enters the Zambesi.

Game in Class "A" may be hunted in the close season until further notice on private land in the Melsetter district by holders of a licence.

"Locust Birds" are strictly protected, *vide* Government Notice No. 390 of 1912.

Elephants on Occupied Farms, Melsetter.—The destruction of Elephants when found on occupied farms on the High Veld in Melsetter District is authorised (*vide* Government Notice No. 284 of 1908).

Trespassing on native reserves, in pursuit of game or otherwise, is prohibited, except with the written permission of the Chief Native Commissioner.

Trypanosomiasis.—Persons in search of game in the southern part of the Sebungwe district are warned of the danger of hunting anywhere west of the Sengwe and Lutope Rivers within the fly area, and especially of proceeding anywhere within the valley of the Busi River.

No. 249 of 1908.] [27th August, 1908.

PROTECTION OF TREES.

IT is hereby notified for public information that any person who shall cut down for use as fuel, or for any other purposes than *bona-fide* farming, mining or manufacturing purposes, or cause to be so cut down the "Wild Westeria" (native name M'Pakwa or M'poea) tree, will be liable to prosecution for contravention of the provisions of the Forest and Herbage Preservation Act, 1859, and upon conviction to a fine not exceeding £100, or to imprisonment with or without hard labour for a term not exceeding six months, or to such fine and imprisonment, or to such imprisonment without a fine.

No. 163 of 1909.] [29th July, 1909.

ANY person who shall cut down or destroy, or cause to be cut down or destroyed, the "Shuma" or "Mashuma" tree, except under written authority from the Estates Office of the British South Africa Company, and subject to such conditions as may be imposed therein, will be liable to prosecution for contravention of the "Forest and Herbage Act, 1859," and, upon conviction, to a fine not exceeding £100, or to imprisonment, with or without hard labour, for a term not exceeding six months, or to such fine or imprisonment, or to such imprisonment without fine.

RHODESIA

Agricultural Journal.

ISSUED BY

The Department of Agriculture,

SALISBURY, RHODESIA.

ADVERTISEMENTS.

The Journal is issued every alternate month.

Application for advertising space should be addressed to the Editor. The rates are as follows, *per issue*:—

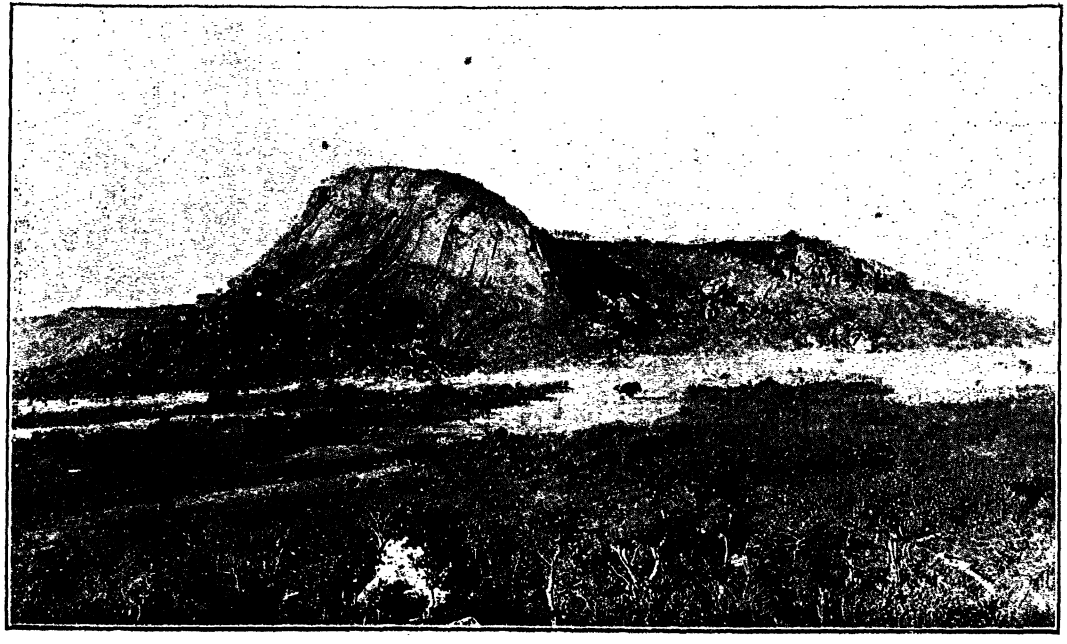
Position.	Whole page. £ s. d.	Half page. £ s. d.	Quarter page. £ s. d.
Inner pages - -	**2 0 0**	**1 5 0**	**0 15 0**
Outer cover (back) -	**4 0 0**	—	—
Inner covers (back and front) and page facing Contents	**3 0 0**	**1 15 0**	**1 0 0**

A discount of 10 per cent. will be allowed for standing or consecutive advertisements running through six issues. Remittances, and electros where desired, should accompany orders. The right is reserved to discontinue the insertion of standing or consecutive advertisements should payment beyond the second issue be delayed.

The right of approval of all advertisements by the Director of Agriculture is reserved, and his decision as to the acceptance or rejection is final.

An additional charge may be made for advertisements printed in special type, equal to any additional charges made by the printers for setting up same.

Advertisements will be accepted from *bona fide* farmers wishing to effect sale, purchase or exchange of produce, live stock or farm implements, at a minimum charge of 2/6 per insertion of 20 words. Extra words will be charged for at the rate of 1/- for every 10 words.



Forest Hill, Makoni. Granite hill on Mr. R. W. Day's farm, Forest Hill.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—No. 4.] AUGUST, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

THE MEAT EXPORT TRADE.—Many reports to hand dealing with the position of the meat industry of the world indicate that for South Africa, including Rhodesia, a golden opportunity is open. Mr. A. R. T. Woods, chairman of the Nelson Lines of steamers, in a letter to Sir Owen Philipps, which has been published, records his opinion that "a definite stage has now been reached in this matter, and that the time has come when plans for the future

development on a large scale of the South African meat export trade should be carefully thought out and matured by the responsible statesmen, officials and agriculturists of the country." He says, "It must be evident to anyone inspecting meat such as we have recently seen arriving from South Africa that the purely experimental stage in this matter of meat export has been already passed, and that it is now proved beyond question that the Union is capable of producing live stock which will hold its own in competition with meat imported from other parts of the world." He endorses General Botha's recent advice to farmers, that the export of mealies "should not develop, but that mealies should be used to feed stock and the exports should be in the form of stock" fed on our own mealies. Other points he emphasises are the need for breeding high-class animals, because of "the supreme importance of maintaining the highest possible reputation for quality," second only to this being the question of butchering and the preparation of meat for the market.

He lays great stress on the necessity that, "in building up this new trade, full advantage should be taken of the experience of the older meat-exporting countries," and on the very great caution and forethought that must be exercised when selecting sites for freezing or chilling works.

Messrs. W. Weddel & Co., Ltd., of London, in their review of the frozen meat trade for 1916, make the same point, and in connection with South Africa say, "All questions affecting transport to freezing works and handling at every stage prior to shipment call for constant and careful attention; so also does the question of erecting any new freezing works on the most suitable sites, with the necessary facilities for despatching regular quantities to this (London) market, year in and year out, if practicable." In the same circular they say, "There is no reason now why South Africa should not go ahead steadily, and, by further improving all the details of preparation for shipment, as well as by grading for weight and quality, get into a strong position for meeting competition when trade becomes normal again."

The meat packing businesses of the United States distribute enormous sums as dividends every year, and it is often



Rhodesian Beef at Smithfield.
(Photograph by The Central Press Photos, Ltd.)

suggested on that account that they make unfair profits at the expense of the consumer. As a matter of fact the actual net profit on every pound of meat sold is minute, but the volume of business is so great that the aggregate total of profits runs into high figures. The profits are given as only one-quarter of one cent per pound on an average for all dressed beef sales, and 2.2 per cent. upon sales of all products. Yet the largest packing house in America last year made a profit of over £4,000,000. The profit on turnover was the highest for many years, viz., 3⅓ per cent., and was equal to over 16 per cent. on the company's capital, for the capital was turned over several times in the year. Their sales reached the gigantic total of £115,000,000. It is evident that the meat packing industry is run on an extremely fine margin of profit, and the success of any factory must depend upon organisation of the highest efficiency in very department, and particularly in the matter of utilising all waste products. The leading packers make as bye-products scores of commercial articles, such as fertilisers, glue, soaps and other toilet articles, violin strings, curled hair, brushes, pepsin and a line of pharmaceutical products, from materials which formerly went to waste.

Yet these great businesses, in spite of so fine a straining out of every conceivable product convertible into money, make an average of only 2.2 per cent. profit on their sales. Competition is keen, and the highest efficiency and most skilful organisation are necessary for success in this industry, upon the threshold of which Rhodesia now stands, with, we believe, every prospect and hope of success.

Birds as Tick Destroyers.—In an interesting paper read before the South African Association for the Advancement of Science at its Maritzburg meeting, and published in the *Journal* issued by that Society, vol. xiii., No. 8, page 371, Mr. F. W. Fitz-Simons, F.Z.S., F.R.M.S., calls attention to the services rendered by birds by devouring ticks. The information furnished by the Curator of the Port Elizabeth Museum may be accepted as authoritative, and deserves to be impressed upon every farmer in the country. We, therefore, quote the passage referred to:—

"The tick is a living, ever-present nightmare to the farmer. Knowing its disease-carrying propensities, he never can tell when it may infect his flocks and herds with a disease that will destroy, perchance, the majority of them. The tick is the most formidable enemy with which the stock farmer has to contend.

"With but few exceptions, the ground birds feed more or less on ticks. Some species of birds, such as the Tick Birds (*Buphaga*), take them direct from the cattle, but the majority feed upon them on the herbage and the ground. When a female tick has gorged herself with blood, she drops from her host and crawls away to seek a suitable place in which to deposit her eggs. These blood-gorged ticks are eagerly sought after by the birds, which frequent the grazing grounds of cattle to seek for them. Every female tick so destroyed means the destruction of thousands of eggs. For instance, a quail, partridge, guinea fowl, lark, rail, starling or any one of the many tick-devouring birds, in a single season is capable of killing vast swarms of ticks directly or indirectly.

"I have found as many as 50 gorged female ticks in the crop of a single cattle egret (*Bubulcus ibis*). Taking the minimum number of eggs laid by one of these ticks at 2,000, we have the tremendous total of 100,000. In the crop of a quail, eight of these mature female ticks were found. This, multiplied by 2,000, makes a total of 16,000 ticks accounted for by one bird in a day; or during the course of the spring and summer the colossal number of three million ticks would have been accounted for by one quail.

"Twelve crowned lapwings (*Stephanibyx coronatus*), or kiewitjes, as they are popularly termed, were shot during December on a cattle-frequented veld. Nine of these contained an average of five blue female ticks distended with blood or eggs. Again taking the minimum number of eggs laid by each tick at 2,000, we have a total of 10,000 ticks accounted for by each of the five birds in one day. In three months these birds, eating female ticks at the rate of five per day, would account for a million. If these had survived, and taking half their number to be females, the following season they would have totalled something like 6,000,000,000."

WITWATERSRAND AGRICULTURAL SOCIETY.—*Rand Fat Stock and Maize Show.*—The second annual fat stock and maize show and sale of pure-bred stock of the Witwatersrand Agricultural Society takes place at the society's show grounds, Milner Park, Johannesburg, on Wednesday, Thursday and Friday, 5th, 6th and 7th September, 1917.

There are in all 15 classes provided for fat cattle, for which the Rand society are offering in prize money a total of about £900. In the ordinary single and group classes the prizes offered are £20 firsts, £10 seconds and £5 thirds, whilst in the two principal group classes the prizes offered are £100 firsts, £50 seconds and £25 thirds, and there is also a special prize of £25 offered for the best five oxen under five years.

The championships this year, for which £50 will be awarded for the best single ox and £100 for the best group of five, will be judged under block test conditions, which provide that special consideration will be given to quality, weight for age and distribution of meat.

The society make a further important provision, that they will guarantee to all exhibitors whose animals are slaughtered under the block test a minimum price therefor of 45s. per 100 lbs. dressed meat.

Altogether for fat stock a total of over £1,100 is offered in prize money.

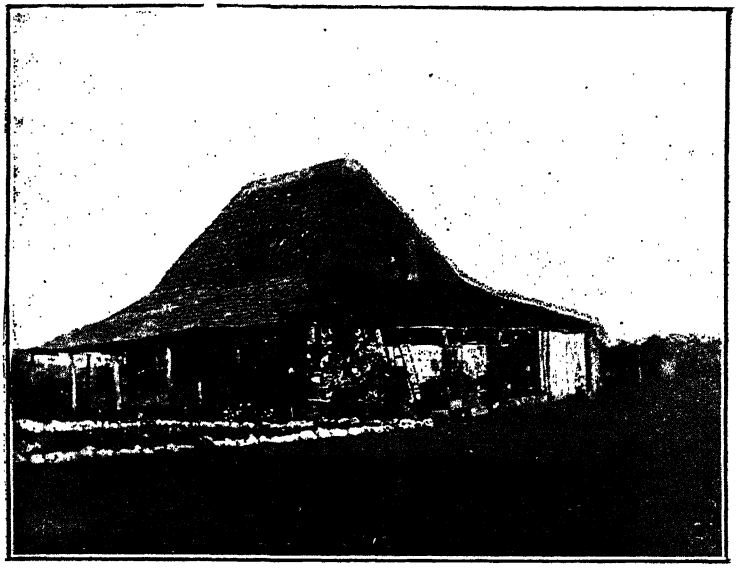
In the maize section there are in all 73 classes provided, with a total prize money of £577 10s., including classes for 10 bags with 10 ears commercial maize, 500 breeding ears, 200 breeding ears, 10 breeding ears and single breeding ear.

In addition to the above, special prizes, amounting to £35, are offered for the best 25 muids with 25 ears of Hickory King mealies, grown by the exhibitor and suitable for export.

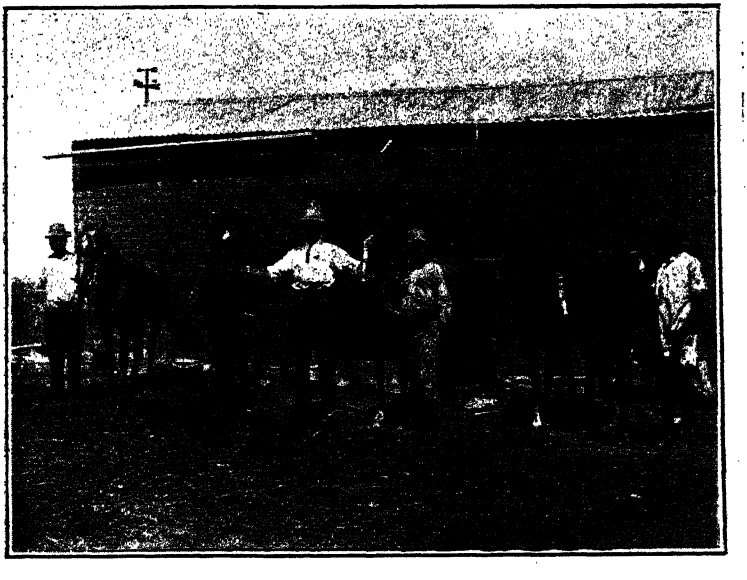
The society also offer their gold and silver medals for the championships in the maize classes. Provision is made throughout the prize list for differentiating in every case as between high and low veld maize, except in the championships, where the competition is open.

Entries for the pure-bred sales close on the 30th July, and for the fat stock and maize classes on the 11th August, 1917, and prize lists, together with all further particulars, may be had on application from the joint secretaries of the society, Box 4344, Johannesburg.

ILLUSTRATIONS.—We are pleased to be able to include among our illustrations in this issue two photographs received from local farmers. One shews a homestead on the farm Stanmore, Victoria district, which was entirely built by the owners, Messrs. S. & A. Jones. The second is a picture of young horses reared in Rhodesia, kindly sent us by the breeders, Messrs. Havard & Havard, of Moria Farm, in the Headlands district. It is interesting to record that some men have the courage to experiment with horse breeding in spite of the terrible handicap of horse sickness. Messrs. Havard & Havard inform us that their horses receive every possible care in the way of stabling, etc.



Homestead built by Messrs. S. & A. Jones, Stanmore Farm, Fort Victoria.



Horses bred by Messrs. Havard & Havard on Farm Moria, Headlands. Mare purchased June, 1913 (on right), and her four foals.

Extracts from the Report of the Director of Agriculture

FOR THE YEAR 1916.

(Continued.)

CROPS.—The total acreage reaped by Europeans during 1916 has been given as 202,946 acres, to which may be added 1,155,585 acres of native crops, and although on the whole the returns were disappointing, the production in the aggregate is considerable. The area prepared during the year by Europeans for next season's harvest was 254,702 acres; that for native crops is not yet available. These figures shew that arable farming, although secondary in importance to pastoral farming, still forms no small part of the industrial wealth of the country. Of the total acreage cultivated by white farmers, no less than 86.05 per cent. was under maize—174,647 acres, from which 680,285 bags were reaped. For next season the total area planted to maize before the end of the year was 203,902 acres, a considerable advance on any previous figure. This increase is extremely satisfactory, especially in view of the fact that so many farmers are absent, shewing, as it does; that those left behind have succeeded in more than maintaining the extent of ground under our staple crop. There is a distinct tendency observable for the cultivation of maize now to be concentrated in the districts most suitable for the crop, and the creation of a recognisable maize belt in which this grain is more economically produced than elsewhere. The utilisation of our maize crops is important. Out of the total of 680,285 bags reaped, 130,959 were reserved for home use by the farmers as food for labourers, for stock and as seed for next year. The amount exported was 63,251 bags, against 26,806 bags imported, leaving a trade balance of 36,445 in our favour. This leaves to be accounted for by consumption within the country and carry over to next year a gross total

of 643,840 bags, or, deducting the amount retained by farmers, a net total of 512,881 bags, for the use of the mines and general consumers. Local consumption was somewhat heavier than in the previous year, owing to the necessity for feeding the natives in those districts where their crops had failed, and the amount available for export was correspondingly reduced. Whatever our production is, some small importation is likely always to take place from points beyond our borders more favourably situated than our own producing centres to certain mines near Umtali, to our labour depôts on the Zambesi and other such places.

A noteworthy feature of arable farming is the steady expansion of crops other than maize, generally termed "side crops," and the gradual introduction of the principles of rotation in districts where arable farming is most advanced. Thus, for example, a considerable amount of sunflowers are now grown, 1,766 acres being under this crop last season, and a return of 1,028,445 pounds obtained. There is every reason to anticipate that this product may become one of our staple exports, as our sample is a particularly fine one, and seems likely to increase further in popularity if a sufficiently large outlet can be assured.

Ground nuts have during the last few years steadily come to the fore, largely owing to the introduction by this Department of improved varieties lending themselves to profitable European modes of cultivation. Experimental exportation has not given encouraging results in the present disturbed conditions of manufacture in Europe, but an outlet has been found in the Union, and this commodity is largely used for food for boys on the mines, and has kept the oil factory in Salisbury fully employed, there being a ready market both for the edible oil produced and for soap manufactured there. The production for the year was 22,415 bags from 3,043 acres, averaging 7.36 bags per acre, as against 10,471 bags off 1,523 acres, averaging 6.87 bags per acre, the previous year, a very satisfactory increase in every direction.

Wheat, which has hitherto been a subordinate crop, and is still only grown on a limited scale, is, owing to increased price, attracting more attention than heretofore. Local production, 5,956 bags last year off 2,051 acres, only supplies a

small fraction of our consumption, importation in all forms amounting to the equivalent of a further 37,670 bags. Difficulty has hitherto been experienced regarding milling, the quantities offering not justifying the erection of the expensive plant necessary to produce superior flour and meal. This need seems likely to be met by private enterprise, and there is every prospect of the acreage under wheat rapidly extending, both as regards the winter crop on damp vleis or under irrigation, and the summer crop grown under rainfall, when once adequate facilities for grinding the grain are assured.

The Department is at present without the services of an expert adviser on tobacco, but an arrangement was come to whereby the industry receives the assistance it most requires at the present time through a subsidy to the Rhodesia Tobacco Co-operative Society, which enables it to employ a skilled leaf expert during the current season. When, as may be anticipated, an extension takes place in tobacco growing, and persons without past experience in the cultivation and curing of the crop take it up, expert advice will again be required. The area of the crop reaped during the year was 1,310 acres, whilst that planted for the coming season was 2,275 acres. The crop harvested amounted to 637,261 pounds, 50 per cent. above the previous season's figures, whilst the better prices being obtained are attracting attention again to the cultivation of tobacco, and a revival in this branch of farming may be looked for. The interests of the tobacco industry received consideration when the opportunity occurred of representatives of the Government and the Co-operative Society interviewing the Hon. Mr. Hughes, then Premier of Australia, on the subject of the interpretation of the Customs agreement. It can only be regretted that a decision has been received from the Government of the Commonwealth adverse to the hopes and wishes of Rhodesian tobacco growers expressed on that occasion.

Other crops, now largely grown but not calling for special comment, include potatoes, beans, dhal, kaffir corn and millets, also linseed and buckwheat on a smaller scale, and fodder crops such as oats, teff grass, Napier fodder, hay, velvet beans and cowpeas and ensilage.

Owing to the ready response which has been given to enquiries made under the operation of the Agricultural

Statistics Ordinance, fairly exact particulars have been collected and published regarding the acreage and yield of all crops and the numbers and increase of live stock for each separate district, and the information so obtained is proving of very general interest and considerable use, and will as time goes on prove a valuable guide in the development of our agricultural and pastoral industries. The statistics have been specially helpful already in dealing with problems connected with the export of maize, oats, potatoes and cattle, the wheat requirements, the measures for famine relief and the food supplies available for our own consumption, and for disposal to outside markets.

Attention is being paid more and more to the growing of grain, fruit, potatoes, vegetables and green forage of different sorts, such as lucerne, oats, rye, barley, Napier fodder and paspalum during the winter season under irrigation. Many farmers to-day have from 5 to 20 acres of land which they irrigate, and several large schemes are in process of being carried out, the latest to be completed being one on the Odzani River, where a furrow some 18 miles long has been constructed commanding a thousand acres or more of land at a very low initial cost.

Without possibilities for irrigation, citrus culture on commercial lines is not recommended. Citrus fruit is being steadily planted, and many trees are about to come into bearing. A difficulty already foreseen is that of securing adequate cold storage space on the steamers, and it will be unfortunate if this young and promising industry should receive a check on this account during the coming year. Orange trees in bearing have increased from 24,000 to over 35,000, with upwards of 50,000 more planted out and coming into profit in the immediate future. Other citrus trees have increased from about 10,000 to over 22,000 in bearing, with an equal number of young trees coming on. The realisation of the crops from these groves represents commercial considerations of some magnitude which can only be provided for by an oversea market. That market is assured, but ocean transport offers difficulties which may seriously discourage a nascent export trade.

Departmental.—The staffs of both the Agricultural and

Veterinary Departments are depleted by many members being on war service, and the remainder are carrying on under difficult conditions. Every branch has been continued, and it has been the endeavour to maintain uninterruptedly, though generally in diminished volume, the various lines of work which have in the past been taken up on behalf of the farming industry. In the absence of many technical and clerical officers, and in view of the rigorous curtailment of expenditure, no expansion was possible. While existing establishments cannot, therefore, be regarded as satisfactory, we are perhaps really fortunate that the interruption of work has not been greater. Additions to the staff which in normal circumstances would have been considered necessary have been held over till better times. The conditions obtaining have entailed on the staff remaining much extra duty, which has been ungrudgingly and patiently performed, and deserves recognition here. Meetings have been attended and addresses given by technical officers wherever possible in the course of their farm to farm tours, advising, investigating and learning the needs of the country in respect of their particular subject. In this way much useful information is acquired and disseminated, but the country is large and the staff few. The Agriculturist, Citrus Adviser, Live Stock Expert and Agricultural Engineers have most occasion to travel in this way, but the Entomologists and Chemist also take the opportunity whenever possible. Apart from diminution and redistribution of the work of those who are away, the decision to close down the Government experiment farm on the granite soil in Matabeleland was carried out.

The whole field of animal industries, the breeding, feeding and care of all forms of live stock, and the marketing of animal products, everything, that is to say, relating to domestic animals with the exception of disease, is still the departmental concern of only one expert; a provision out of all proportion to the magnitude and variety of the interests and capital represented by our live stock, as our statistical figures indicate. Although the number of our farmers may temporarily be stationary, our stock is increasing steadily, and outlet for the surplus must be found, and ways of utilising our finished product, be it beef, bacon, butter, cheese, wool, hides or other commodity, provided. Once they have reached

the final stage of preparation, all such articles are of a perishable nature demanding rapid consumption, if loss is to be avoided; hence, in addition to the problems of production, we are now faced with the difficulties of marketing, accentuated at the moment by the economic disturbances of war.

The work of the Agriculturist's branch has been maintained, in spite of a diminished staff. Expansion of existing activities has gone on, though new lines, however necessary or desirable, cannot in existing circumstances be taken up. Experimentation has been attended with useful practical results. The programme of investigations is proceeding systematically, if only slowly, haste being impossible where but one step each season is possible.

The experimental grounds at the laboratories, Salisbury, are mainly devoted to the testing of possible new crops, which, after a probationary period, sometimes extending over several years, are either condemned and discarded, or transferred for further trial on a field scale and under ordinary farming conditions to the experiment farm, Gwebi, and thence in due course, if found to warrant recommendation, brought to public notice. The process is necessarily tedious, but several seasons of systematic progress on these lines have now elapsed, and the method is being justified by results. These investigations are approaching a stage when we can recommend to farmers a rust-resistant wheat suitable for summer cultivation under rainfall on ordinary soils, to offer one or perhaps two varieties of oats of which the same may be said, to provide grasses and other fodder plants suitable for permanent pasture of superior quality on old lands, to suggest a series of side crops to be utilised in rotation with maize and suitable for consumption on the farm, some marketable locally and others which also may be exported in raw or manufactured form. In addition, there are a number of promising crops of which we have not yet had sufficient experience to justify recommendation to farmers for trial, but which are being tested on practical lines. The production *de novo* from the original sources of a standard type of Salisbury White Maize, in which the relative proportions of the original parents are artificially controlled and regulated, has been successfully carried out at Salisbury, and the new form is now being improved by selection and increased

in quantity before distribution to farmers can be commenced a year or two hence. Issues of seed to farmers for trial is a successful line of work; last year about 300 farmers co-operated with the Department in this way. The demand is good, but difficulty is experienced in inducing farmers to give reports of the results for the benefit of other farmers.

The production of trees and ornamental shrubs at the forest nursery has gone on uninterruptedly during the year, and, in addition, certain new experimental plantations were laid out, and extensive permanent improvements effected. Sales at somewhat below cost price have been made to farmers and others to the value of £397 19s. 8d., whilst free issues were made to Government institutions to the extent of £76 16s. 10d., a total for the year of £474 16s. 6d.

Owing to the restriction on the export of maize, maize grading was practically in abeyance last season. A request to grade 16,000 bags from the Farmers' Co-operative Society was, however, dealt with.

The Agriculturist attended numerous meetings to deliver lectures, and also made tours amongst the farmers as far as time allowed. A prolonged observation of the working of small agricultural holdings was completed, and a report covering three years' operations submitted.

At the Government experiment farm, Gwebi, practical and scientific investigations regarding known and potential crops and in the feeding and treatment of live stock are conducted. The results attained do not need to be particularised here, as they are recorded at length from time to time in the pages of the *Agricultural Journal*, and discussed whenever opportunity occurs with those for whose particular benefit they were devised and carried out. Over 400 acres were under the plough, and the crops, with due allowance for a somewhat unfavourable season, were quite good. It is now well understood that the chief value of the experiment farm rests not in the farming of the land, but in the experiments conducted, and that success or otherwise is to be measured by the information collected and disseminated each year, and accumulated from the research of successive years; also that with crop

research only one step each season is possible. The results from this point of view are satisfactory, but might have been more so had the means available not been restricted to a minimum. In spite of this drawback, it may be claimed that a considerable advance is being made in our knowledge of crops suitable to this country. The separate handling of every experimental plot implies a vast amount of care and labour which ordinary farm crops do not require, measurement of the acreage, fertiliser and seed used, cultural treatment given, and separate harvesting and weighing of returns, all of which implies heavier costs than the ordinary farmer expends. Whilst the value of the work carried out on the Gwebi experiment farm lies in the information acquired there, and disseminated amongst the farmers, the crops harvested and stock sold bring in a considerable sum to set against the vote of £1,400. Crops were grown to the value of £2,568, of which part was consumed on the farm, part used on other departmental institutions, such as the forest nursery and the veterinary laboratory, and much sent as seed to farmers all over the country. The actual output from the farm amounted in market value to £654 2s. 9d. The crops sent off the farm comprised maize in three varieties, several sorts of linseed, ground nuts, kaffir corn, sunflower, velvet beans, wheat, oats, buckwheat, cowpeas, dhal, castor oil, majordas, Napier fodder, and large quantities of artificial and veld hay. This list speaks well for the possibilities of mixed farming in Southern Rhodesia, especially when it is recollected that the list contains no fruit or vegetables, but only crops that can be grown on a field scale, and that, in addition to these, quite a number are grown, but not on a commercial scale as yet. The valuation of live stock at £2,711 shews a decrease of £91 for the year, but sales, which during the year included Friesland bulls, rams, cows and fat oxen, sheep and wool, yielded £967 11s. 8d., leaving a profit balance on stock of £876 1s. 8d.

The only experiments with live stock possible under existing conditions were the stall feeding of bullocks, and these were successfully carried out, 32 head being fattened off. Full information regarding the weights of the animals and amount of food given them, the methods followed and the prices realised has been published. Great interest is shewn in these experiments, which are most timely, in view of the growing

practice of stall feeding for the butcher. The merino flock is doing well, and numbers have now so increased that, in addition to the sale of rams, feeding experiments with sheep have been initiated. For lack of funds and accommodation pig breeding and fattening is not possible, although there is room for investigation as to the cheapest and best modes of producing pigs for bacon, and an abundance of suitable food is available on the farm. During the year the oxen, sheep and mules used at the Longila experiment farm, now closed down, were transferred to the Gwebi, and on the other hand the small Shorthorn herd of ten head was disposed of. The herd of breeding cattle consists now of some 48 Frieslands, having trebled its numbers in six years, and bulls are sold to farmers from time to time. The work of a stud farm is, therefore, in actual operation, though on much too small a scale to be effective, and with a breed which, however useful in itself for dairy purposes, cannot be regarded as being in much demand or popular in the country; the cattle have, however, done exceptionally well.

The services of the Agricultural Engineer and his assistant were in greater demand than it is possible for them to keep up with, and in spite of every effort the work has fallen in arrear. No fewer than 114 visits were paid, some involving considerable labour both in surveying in the field and in subsequent drafting and calculating in the office, and several schemes of some magnitude were prepared. The new acreage of irrigable land advised upon, additional to that dealt with but previously known, was 1,328 acres. The schemes consist for the main part of small areas. Advice is frequently also sought with regard to wells and supplies of drinking water, dams, pumps and difficulties regarding machinery. Gradually the intention of the Water Ordinance is making itself felt, and advantage is taken of the facilities it affords to have rights to water properly defined. This is a growing subject claiming considerable attention. The control of the meteorological work of the country also takes up much time, and improvements are constantly being made in the systematic collection of data. It is satisfactory to find the advice of the Engineers in such constant demand, but regrettable that it has not been found possible adequately to meet all requests for their services.

The Citrus Expert devoted himself mainly to visiting growers for the purpose of advising them on cultural matters, steadily preparing for the approaching time when export will become necessary, which is now at hand.

The chemical branch has been carried on, in the absence of the Chemist on war service, by the Assistant Chemist, with the help of another assistant, whose time is almost exclusively devoted to the examination of samples of dip fluid, with a view to ensuring the strength of solutions at a safe and effective level. Much advantage is taken of these facilities—no fewer than 1,011 samples of dip having been tested during the year, as against 573 in 1915. A means was devised at the laboratory of counteracting the possibility of change in the chemical form of the arsenic between the time of taking the sample and its examination. Of other samples examined during the year, the number was 234, classified as follows:—

Toxicological viscera, etc.	99
Arsenite of soda	8
Wood ashes	3
Fertilisers and cave guano	16
Lime	17
Minerals and rocks	13
Soils	40
Waters	10
Miscellaneous	28
	234

From these figures it will be observed that no fewer than 1,118 out of 1,244 analyses were concerned with arsenic, shewing the important part played by dipping, and the frequent cases of stock poisoning attributed, rightly or wrongly, to this cause. Many animals die from licking arsenical salts near dips, or maliciously or accidentally placed elsewhere, and some from arsenic absorbed at mines where the ore is charged with this substance. The examination of viscera sent in by veterinary officers and farmers revealed the presence of arsenic in 49 instances out of the 99 cases, some involving several animals. Other analytical work was maintained in the chemical laboratories as in the past, and is limited only by the personnel and accommodation provided. By an increase of

both, this important section of the work of the Department could be readily widened and rendered even more useful, especially in the direction of research. Artificial fertilisers, the use of which is rapidly extending, were most difficult to obtain during the year, and the brands to which farmers were becoming accustomed were soon unobtainable, whilst prices rose to prohibitive figures, in view of present prices of maize, tobacco and potatoes, the chief crops for which fertilisers are used. The want of potash, the world's stock of which is in Germany, the prior claim on sulphuric acid and nitrates for munitions, the prohibition of export of slag from Great Britain, the revival of arable farming there and freight difficulties, all tended to curtail supplies available for this remote country. Increased use of cave guanos, wood ash and lime and better utilisation of kraal manure have resulted. Under the law controlling the sale of artificial manures, 25 brands of fertilisers were registered during the year and warranted as to composition, as against 12 in the previous year. The system has worked smoothly; it is only to be regretted that the farming community as a whole lacks the elementary knowledge of chemistry necessary to interpret the analysis and to understand the value of the various constituents. This is a want which it is very desirable should be supplied by means of technical instruction at farmers' meetings or by courses of instruction, but this is unfortunately out of the question with the restricted staff available. A local development of some interest is the commencement during the year of the manufacture in Salisbury of artificial fertilisers from local sources. Farmers are giving a fair trial to this new preparation with maize, tobacco and potatoes, and the results will be watched with close attention.

The work of the entomological branch divides itself into three—advice to farmers and fruit growers regarding pests, research into the life history of injurious insects, and the examination of nurseries and importations of fruit and fruit trees. Constant enquiries are made regarding attacks on crops, fruit and flowers, and the information furnished is obviously much appreciated. Further knowledge is steadily being acquired regarding a great variety of entomological matters, notably last year the distribution of tsetse fly, the habits and the means of destroying various cut worms, chafers, wire worm,

surface beetles and kindred pests. Experiments were conducted to test the relative efficacy of various methods of combating insect plagues, by poisoning, by mechanical means and by adopting cultural precautionary measures. The efficacy of different preparations was tested, such as arsenate of lead, arsenite of lime, resin washes and various proprietary preparations and compounds. Amongst other practical results it is worthy of mention that a home-made adhesive fly paper suited to Rhodesian conditions has been evolved. Articles in the *Agricultural Journal,* lectures to farmers and displays at the agricultural shows have as usual been given, with a view to extending popular knowledge of the subjects dealt with by our Entomologists. Inspection of plants imported constitutes an important protective measure, the magnitude of which may be gauged from the fact that 4,435 consignments were dealt with by the Plant Inspectors. Twelve nurseries were inspected under the Ordinance dealing with this subject, and new regulations framed and put in operation regarding the fumigation of trees from nurseries.

Abridged Report of the Chief Veterinary Surgeon

FOR THE YEAR 1916.

AFRICAN COAST FEVER.—The year was marked by the appearance of coast fever in the Mrewa district, in which it had not at any time previously existed, and its re-appearance in Gwelo district after over ten years' freedom therefrom. In neither case have we been able to trace the source of infection or the means by which it was conveyed. The nearest existing centres of infection to the Mrewa outbreak were about 60 miles distant, in Salisbury district; and in the case of the Hunter's Road outbreak the nearest infected area is about 130 miles. Direct transmission by cattle seems impossible, in view of the control exercised at all infected centres; indirect transmission, as by clothing, blankets, grass, etc., however improbable, is not impossible, nor is the malicious dissemination of infected ticks. Notwithstanding these outbreaks in previously clean districts, the position generally shews a marked improvement compared with the previous year. There were fewer fresh outbreaks—20, as against 35—and a greatly decreased mortality—382 head, as against 1,174. Of the 38 centres on which disease occurred during 1915, only 15 shewed infection during 1916.

Salisbury District.—The position in regard to coast fever in the Salisbury district shewed a marked improvement during the year. No fresh outbreaks occurred, and of the 11 centres at which infection had manifested itself during the previous twelve months, four only shewed a slight mortality in January, February and March, since when there have been no cases of coast fever in the district.

Mazoe District.—At the beginning of the year two centres existed at which disease had occurred during the previous twelve months, viz., the Belford Estate and the unalienated

land around the Mazoe township. At the former all the cattle had been destroyed in 1915. At the latter several small herds remained on the infected veld and were subjected to three-day dipping; one case of coast fever occurred amongst these in January and one in February. A fresh outbreak occurred in May amongst a small lot of cattle on the farm Welbeck, which lies between the two centres above referred to, and caused undoubtedly by the removal of certain cattle through Welbeck on the 4th May, 1915, which a week later were found to be infected with coast fever. The herd was slaughtered and the farm fenced.

Mrewa District.—In May the presence of coast fever infection was discovered at Mrewa's Location, about 12 miles east of Mrewa. Several herds were found to be infected, and that the disease had been in existence for some time was evident from the large number of animals found to be affected at the first inspection. From the enquiries made by the Native Commissioner it appears that one beast died at Mrewa's Kraal about the end of January and two between the 1st and 10th of February. No further mortality appears to have occurred until early in May. The total number of cattle involved was 451 head, and arrangements were made for their immediate removal to a temperature camp on clean veld about four miles distant. Prior to removal the total mortality was 51 head, including animals destroyed on shewing a rise of temperature. Two further outbreaks occurred 15 and 8 miles distant respectively from the original centre. In addition to the Police measures instituted, arrangements were at once made for the construction of dipping tanks, and within four months over 7,000 head of native cattle in the Mangwendi and Uzumba Reserves were being regularly dipped.

Melsetter District.—At the beginning of the year there were 25 infected farms. On 15 of these no cases of coast fever occurred during the year, on 6 the mortality was slight and on 4 somewhat heavy. The total mortality at these centres was 112 head, as against 900 head during the previous year. Fourteen fresh outbreaks occurred, involving 1,293 head of cattle, of which 107 head died. In most cases the herds had been dipped for some time previous to the discovery of the disease amongst them. In one case, however, 34 out of 44 succumbed

as the result of gross neglect in failing to maintain the dipping solution at proper strength: on one occasion it was found to contain less than half the proper quantity of arsenic. In another case, where infection was intense and no tank available, 34 out of 38 died within three months. If these two herds are excluded, we have a total mortality of 39 head out of 1,211, a most striking example of the efficacy of the dipping tank as a means of combating coast fever infection.

Umtali District.—No cases of disease occurred on the two areas regarded as infected, and towards the end of the year the quarantine was raised.

Gwelo District.—During the last week of May two beasts died on the farm Riverbend, in the northern section of Gwelo district. The carcases were rather too decomposed to permit of a satisfactory examination, but spleen and blood preparations examined microscopically left little doubt of the existence of coast fever. As the district had been free from this disease for over ten years, and as no infection was known to exist within a radius of at least 130 miles, careful observations were undertaken to verify the diagnosis, and within a few weeks the disease was demonstrated in several animals. The following month the disease was discovered on the adjoining farm Cross Roads. The infected farms were fenced and compulsory dipping enforced in a large area around them, and so far there has been no suspicion of the existence of infection elsewhere in the district.

Black Quarter.—Shortly after the heavy rains which fell in the Bulalima-Mangwe district in November, several outbreaks of black quarter occurred. The mortality was somewhat heavy. It was reported that animals of all ages contracted the disease and that a number recovered. The heavy rains after several years of drought were probably the determining influence in the manifestation of infection. Hitherto we have been remarkably free from this disease—in fact, since the Occupation, the existence of infection has been recorded on two occasions only. It is not unlikely, however, that it is more widely distributed than our observations in the past would appear to shew. A number of deaths are reported every year as the result of snake bite, of which probably a large proportion are really due to black quarter.

TUBERCULOSIS.—In a herd in the Umtali district an aged cow was destroyed as suspected of tuberculosis. *Post-mortem* and microscopic examinations confirmed the diagnosis. All in-contact animals—56 head—were tested with tuberculin, of which 8 re-acted. Amongst the 12,719 head of slaughter cattle exported to the Johannesburg abattoirs, 5 cases of tuberculosis were discovered.

CONTAGIOUS ABORTION.—A few fresh centres of infection were discovered during the year in the Salisbury and Mazoe districts. The present imperfect state of our knowledge of this disease and the conditions under which cattle are raised and managed in this country render it difficult to suggest measures for the eradication of infection or preventing its spread. A few of the infected herds have been inoculated with massive doses of dead bacilli. Although this process is alleged by certain authorities to be useless, the results appear to be favourable, but whether they are due to the treatment or other factors one cannot say. The recent investigations in immunisation with live cultures of the bacilli which have been carried out in England are most encouraging, but if such process is ultimately established as a satisfactory means of dealing with the disease, its application in this country would be impossible except in young heifers, and even then we should require to be assured that there was no possibility of animals immunised in this way becoming disseminators of infection.

ANTHRAX, LUNG SICKNESS (CONTAGIOUS PLEURO-PNEUMONIA OF CATTLE), RABIES, GLANDERS.—No cases of any of these diseases occurred during the year. The mallein test for glanders was applied to all imported horses, mules and donkeys, with negative results.

HORSE SICKNESS.—The mortality from this cause was one of the slightest on record.

EQUINE INFLUENZA.—An outbreak of this disease occurred in Bulawayo and adjoining districts during September. Fully 90 per cent. of horses, many mules and donkeys were affected. A slight mortality occurred amongst donkeys and mules, but none in horses.

Quarter Evil.

ITS HISTORY IN RHODESIA.

By C. R. Edmonds, Assistant Chief Veterinary Surgeon.

The history of quarter evil as known in Rhodesia is not without interest, and may perhaps be of value. Matabeleland, the portion of Rhodesia in which outbreaks of the disease have occurred, has been occupied by Europeans for about twenty-three years. Soon after its occupation the country was pretty well denuded of cattle by rinderpest, therefore for several years there was not a great amount of material in the shape of young cattle for quarter evil to play havoc with.

Since the occupation of the country there have always been qualified veterinary surgeons here, and considering quarter evil is such a well-known and easily diagnosed disease, I think it is safe to assume that it could never have existed to any great extent without having been recognised; though, of course, owing to the great distances, difficulty of travelling, and other circumstances pertaining to the early days of the country, it is quite possible for outbreaks to have occurred in isolated parts without it being recognised, and it was not until 1911 that the disease was first diagnosed.

On 2nd June, 1911, Mr. Hooper Sharpe, District Veterinary Surgeon, Bulawayo, went to Redbank, in the Khami Valley, to investigate a disease prevalent amongst cattle attributed to "snake bite." He diagnosed the complaint as quarter evil, which diagnosis was subsequently confirmed by the Government Veterinary Bacteriologist by microscopical examination and experimental inoculation.

On referring to the reports on the subject, I find that on farm "A," where Mr. Sharpe diagnosed the disease, eight head died in four days, and others were sick; also five head had

died in the vicinity recently from this supposed "snake bite." In a report dated 23rd June, 1911, I summarised what had occurred during the twelve months previous to Mr. Sharpe's diagnosis. On farm "B," adjoining "A," 11 head had died during the twelve months from various causes, some of which were attributed to "snake bite." On farm "C," adjoining "B," three native cattle died from "snake bite." On farm "D," adjoining "C," 11 head died, similar to "B." On farm "E," adjoining farms "C" and "D," five head died, all from "snake bite." On farm "F," adjoining "D" and "E," three head died from "snake bite"; previously this owner had lost several head, some of which were attributed to "snake bite," on land some few miles to the south-east of farm "A."

On 3rd July, 1911, one beast belonging to a native on farm "G," adjoining "A" on the south, died from "snake bite," and this ended the outbreak so far as that locality was concerned. It is impossible to say how many animals actually died from quarter evil out of those enumerated, but probably there was a fairly large percentage. The treatment adopted on farm "A" was to move the animals to another portion of the farm, and the disease stopped.

On 8th July, 1911, "snake bite" was reported in the Insiza district, and D.V.S. Sharpe again investigated and diagnosed quarter evil. The same method of moving the cattle was adopted, and nine head in all died on the farm.

On 14th July it was reported that two cattle had died of "snake bite" a week previously on a farm a few miles away on the Insiza River, and on 20th July another case of "snake bite" was reported as having occurred some time previously on another farm on the Insiza River; no action with these two farms was taken, and no further deaths in the district occurred.

From the correspondence I note that I was curious about the natives not recognising the disease, and made enquiries if they had had no previous experience of it, with negative results. So far as I could gather the natives did not know it, and put it down to "snake bite."

No further official reports of this disease occurred until December, 1916. No doubt cases of "snake bite" (?) occurred in parts of Matabeleland, but, as they were only odd cases or

few in number, no report was made to the Department, but I think it is fair to assume that probably some of these cases may have been due to quarter evil.

On 19th December, 1916, Mr. Geo. Pinchin, late Government Veterinary Surgeon, left Bulawayo to investigate an outbreak of disease in the Plumtree district. On arrival at Glamorgan farm, he found that 24 head had died, and was able, from a *post-mortem* he held, to diagnose the disease as quarter evil. Reports were current, and the information was apparently correct, that large numbers of cattle had died from this disease in the territories adjoining our southern border.

Early in January, 1917, Mr. Pinchin, accompanied by Mr. H. M. Jackson, Superintendent of Natives, travelled down to the Semokwe to enquire into outbreaks of quarter evil amongst European and native cattle in that locality. Several outbreaks of the disease occurred from then on south of Bulawayo, and, so far as I am aware, the disease was stopped in every instance where the original precautions recommended at the Glamorgan outbreak were carried out, namely, of burning or burying the carcases of the dead, and removing the remainder of the herd to new veld and water.

Towards the end of May the disease began to break out in the Bulawayo district, and by the middle of June it reached its greatest prevalence, since when the outbreaks have been less frequent, and, broadly speaking, each outbreak has been further north.

In an article on this disease that appeared in the *Rhodesia Agricultural Journal* in February last by the late Mr. Pinchin and myself occurs the sentence, "The first thing that strikes one is that it (quarter evil) is not recognised by the natives." In this connection I may point out that the disease had not only attacked cattle of Europeans who speak the native language fluently, and who, it can be presumed, would question the natives as to their knowledge of the disease, but it also killed cattle belonging to natives. In one case animals belonging to a big native chief died, and yet there was no information forthcoming of the natives having any knowledge of the disease prior to the European occupation of the Territory. Still, I was not satisfied on this point, and I asked Mr. Jackson, Superintendent of Natives, if he

would kindly question the old men of the natives on the subject, as evidently the younger generation did not know anything of it. This he did, first in the Belingwe district, I think, and since then from other sources. His investigations are most interesting, and I quote the notes he has kindly supplied me with on the matter:—

"Before the European occupation the disease was known. At the outset it was mistaken for snake bite, until the frequency of cases shewed that to be impossible. It was known as *Igazi* (blood) and by its Bechuana name of *Isimakamaka* (meaning unknown). It also attacked goats and sheep in some seasons, when it was regarded as a distinct disease and called *Magomenkula* (chooses the big or fat), the symptoms being identical with *Igazi*. It was ultimately recognised as a manifestation of the same disease, which might be communicably infectious, and strict laws were made that no meat was to be carried away from where the animals died. The eating of the meat was permitted at the place where the death occurred, and the burying of the bones and refuse was strictly adhered to.

"During the heavy rains in 1914 and 1915, duiker were found dead shewing all the symptoms of quarter evil."

I must leave it to others more able to fathom the native mind than I am to explain the reason why it has taken all this time to stir up in the brain of these old fellows the recollection of the disease having occurred many years ago. As the disease attacks sheep and goats of all ages, their name for it in those animals appears to be a most appropriate one. The native law as to the disposal of the carcase is also interesting. With regard to the deaths in the duikers, I remember hearing of that. Many died in the Insiza district, but I never heard any cause of death quoted until now. It may appear a trifle strange that if duikers died from quarter evil, why did not cattle die? But in Mr. Pinchin's report at Plumtree he stated only sheep were dying at one outbreak, although cattle were also present on the land.

The foregoing is the history of quarter evil in Rhodesia so far as I am aware of it. Perhaps we may learn from it something useful for our future guidance, but there is no need to prophesy.

Trees suitable for the Farm and for Ornamental Purposes.

By W. E. Dowsett, Curator, Rhodes' Matopo Park.

In giving a list of trees suitable for the farm and for ornamental purposes for beautifying the homestead surroundings, I am including only those that have done rather well here, and I think it can be assumed that these should do even better in Mashonaland, where the rainfall is greater and the temperature extremes not so great. In Matabeleland the frosts are also much greater; in July, 1911, the ground temperature fell to 6 degrees above zero, a temperature never approached in Mashonaland, and most winters we have 20 degrees of frost. I am, of course, only speaking of this particular locality, and my remarks do not apply to districts of lower altitudes. The shade temperature has been as high as 114 degrees Fahr. The rainfall, too, is not so even as in Mashonaland. In the season 1914-15 it was 49.72 inches; this season it has only reached 14.87 inches; so it will be seen that the trees here have had to grow under rather severe conditions, and therefore can be fairly well recommended.

I would not suggest planting eucalypts near the homestead, for, owing to their height, they exclude the air to a great extent (trees shelter the ground from the wind for six times their height, *i.e.*, a tree 50 feet in height will break the wind for 300 feet), and again the eucalypt is a gloomy looking tree to have near one's house.

It is not necessary to give a long list of trees, as this might be somewhat confusing, so I shall confine the list to the better class of tree that will be found useful as well as ornamental. Most of these can be obtained from the Government

forest nurseries, Salisbury, of a size large enough to plant out. Where the ground is very dry and stony, it is a good plan to fill up with aloes, a number of which are very grand bloomers. Care should be taken that none of the following are planted on ground with a clay sub-soil:—

Callitris calcarata, E. Australia. A tree to 70 feet in height; likes sand. Wood strong and durable.

C. robusta. Above remarks apply to this variety.

Casuarina suberosa, the oak of S.E. Australia. Height about 40 feet. Valuable wood.

C. torulosa. Height about 70 feet. Timber good.

Cedrela toona, Singapore cedar. Is doing well where sheltered from much frost. Very valuable wood for furniture. Not troubled by white ants. Good quick grower.

Cupressus arizonica. One of the finest cypress trees here. Is very hardy against drought and frost, and is a fairly quick grower. Very handsome for scenic purposes.

C. benthami, Mexico. To 60 feet in height. Wood durable and valuable.

C. sempervirens, common cypress, S. Europe and S.W. Asia. Likes limestone. Is a good hardy tree.

C. elegans. A splendid straight grower, very hardy against drought and frost. Timber valuable.

C. torulosa, Nepal cypress. Height about 40 feet. Timber very durable. Prefers limestone. Splendid for wind-breaks.

Dalbergia sisso, N. India to Afghanistan. Attains a height of 40 feet. Stands frost fairly well. Wood very elastic. Seasons very well; does not warp or split; is easily worked, and takes a fine polish. Altogether a fine tree.

Eucalyptus citriodora, lemon-scented gum, Queensland. Handsome tree of useful timber. Tender against frost as a very young tree.

E. hemiphloia, S.E. Australia. To 90 feet in height. Timber suitable for shafts, spokes and similar work. Splendid drought resister.



Cupressus elegans.



Cupressus glauca.



Jacaranda mimosæfolia.



Cupressus arizonica.



Casuarina suberosa.



Bambusa vulgaris.

E. polyanthema, S.E. Australia. Red box tree. Attains a height of 150 feet. Hard and lasting timber. Very suitable for mining work. Splendid fuel. Highly recommended for growing in this Territory.

E. redunca, white gum tree of W. Australia. Thrives well on poor soil. Wood valuable for wheelwrights' work.

E. rostrata, red gum tree of S. Australia. Attains a height of 200 feet. Is a good drought- and frost-resister. Timber hard, strong and durable, either above or under ground, or in water.

E. tereticornis. Very similar to above.

Grevillea robusta, silver or silky oak, E. Australia. Height 150 feet. Good drought-resister. Timber very valuable for furniture. A handsome tree and a rapid grower; likes sand.

Jacaranda mimosæfolia, Brazil. A fairly hardy tree after the third year. Timber valuable. Is a fairly quick grower. Is noted for its gorgeous flowers.

Juniperus bermudiana, pencil cedar of Bermuda. Grows to 90 feet. Furnishes a valuable red wood. Will thrive on very poor soil.

Lagunaria patersonii, Norfolk Island. Height about 30 feet. An ornamental evergreen. Dislikes hard frosts when young. Handsome flowers.

Morus nigra, black mulberry, Persia. Height about 60 feet. Bears fruit profusely and of good flavour here. Is very hardy and adaptable regarding soils.

Pinus halepensis, Aleppo pine, S. Europe and N. Africa. A tree up to 80 feet. Timber valuable for furniture. Is a good drought- and frost-resister; likes lime.

P. longifolia, cheer pine, Himalaya Mountains. A handsome tree; grows to 100 feet. Is hardy against frost and heat, also drought. Timber valuable for buildings.

P. pinaster, cluster pine, shores of the Mediterranean Sea. Grows to a height of about 60 feet; likes sand. It is used extensively for consolidating sandy coasts. Does not care for calcareous soils.

The following are useful for hedges:—

Aberia caffra, kei apple. Bears a good fruit. Is cattle proof.

Lycium horrida. Is cattle proof.

Punica granatum, pomegranate.

Morus alba, white mulberry. Can be trimmed to a very close hedge.

Plumbago capensis.

Tecoma stans, *T. smithii*, *T. velutina*.

Tecomaria capensis.

Thuya occidentalis.

The following are useful for wind-breaks:—

Cupressus arizonica, *C. elegans*, *C. torulosa*, *C. sinensis*.

Eucalyptus cornuta, *E. redunca*, *E. hemiphloia*, *E. polyanthema*, *E. rostrata*, *E. tereticornis*, *E. sieberiana*.

Pinus halepensis, *P. longifolia*, *P. pinaster*.

Manuring of Maize on Government Experiment Farm, Gwebi.

By A. G. Holborow, F.I.C., Assistant Agricultural Chemist.

During last season (1916-17) the fertilising of maize has again engaged the attention of the Department, and although manures of the inorganic class are becoming increasingly difficult to obtain, it has been thought expedient to continue the programme initiated in 1911. These field trials on maize grown on red soil in Rhodesia were inaugurated when fertilisers were cheaper than they are to-day. It is hoped, in the passing of hostilities, that the cost of artificials will again become normal. The value of these experiments will then be more real, and the deductions drawn from the results obtained will be seen to have a more practical bearing.

It is of interest to review the work completed during the past six years, and trace how the formula of our maize dressing was first arrived at, and the reason for its modification afterwards. These deductions have been formulated and follow on as the direct consequence of results obtained in field practice, and, further, have become established by virtue of corroboration.

If the first year's experiments (1911), which were entered upon with so much interest and anticipation, be again brought to notice, it is seen that chemical compounds, each containing one essential plant food, *i.e.*, either nitrogen or phosphoric oxide or potash, were taken. These were distributed singly, also in pairs, and finally as a complete fertiliser dressing containing all three.

The three manures actually used were:—

(1) double superphosphate, containing 42 per cent. water-soluble phosphoric oxide (P_2O_5);

(2) nitrate of soda, containing 15 per cent. of nitrogen;

(3) sulphate of potash, containing 50 per cent. of potash (K_2O).

Plots were dressed with phosphoric oxide, others with phosphoric oxide plus nitrogen; phosphoric oxide plus potash; potash plus nitrogen; and phosphoric oxide plus potash plus nitrogen.

By careful measuring, weighing and supervision, it soon became apparent that the complete dressing was the one which was found to be the most economical and profitable.

This acre dressing contained:—

75 lbs. nitrate of soda;
75 lbs. double superphosphate;
40 lbs. sulphate of potash;

costing 32s. 6d., and giving a profit, after deducting the cost of the dressing, of 50s. 11d., due to the increase in the yield of maize over three years.

From the results of the first year's crop it was seen that nitrate of soda did not have a very appreciable effect upon the yield, and it was decided to recommend a reduction of the ingredient from 75 lbs. to 50 lbs. per acre. The cost of this modified dressing then became 28s. 6d. per acre.

It soon became the opinion of many maize growers that an outlay of 28s. 6d. per acre was rather high, and to meet this difficulty the dressing was proportionally reduced to one costing only 20s. per acre. It was thought advisable to test this new Rhodesia maize fertiliser dressing containing:—

25 lbs. nitrate of soda;
65 lbs. double superphosphate;
25 lbs. sulphate of potash;

and prove, if possible, if the reduction in amount per acre was justifiable. The results of the field test far exceeded our expectations, for no material increase in the maize crop was obtained by doubling the above dressing. The actual figures obtained are as follows:—

Manurial dressing, per acre.	Effect of fertiliser in 1915, first season after application.		Effect of fertiliser in 1916, second season after application.		Effect of fertiliser in 1917, third season after application.		Combined yield obtained in seasons 1915, 1916 and 1917, and increase resulting from application of fertiliser.		Value of three years' increase at 8/- per bag.	Cost of fertiliser dressing, per acre (pre-war prices).
	Total yield of grain, per acre.	Increase due to manuring, per acre.	Total yield of grain, per acre.	Increase due to manuring, per acre.	Total yield of grain, per acre.	Increase due to manuring, per acre.	Total yield of grain in three seasons, per acre.	Total increase in three seasons due to manuring in season 1914-15, per acre.		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
65 lbs. double superphosphate 35 lbs. nitrate of soda 25 lbs. sulphate of potash	3,293	1,232	2,097	806	1,690	644	7,080	2,682	107/-	20/-
65 lbs. double superphosphate 12 lbs. sulphate of ammonia 20 lbs. blood meal 20 lbs. sulphate of potash	3,475	1,414	2,216	925	1,919	873	7,610	3,212	128/-	18/11
140 lbs. basic slag 12 lbs. nitrate of soda 15 lbs. blood meal 17 lbs. sulphate of potash ...	3,186	1,125	2,053	762	1,713	667	6,952	2,554	100/-	19/11
No manure	2,061	...	1,291	...	1,046	...	4,398	...	...	...

(1) double superphosphate, containing 42 per cent. water-soluble phosphoric oxide (P_2O_5);

(2) nitrate of soda, containing 15 per cent. of nitrogen;

(3) sulphate of potash, containing 50 per cent. of potash (K_2O).

Plots were dressed with phosphoric oxide, others with phosphoric oxide plus nitrogen; phosphoric oxide plus potash; potash plus nitrogen; and phosphoric oxide plus potash plus nitrogen.

By careful measuring, weighing and supervision, it soon became apparent that the complete dressing was the one which was found to be the most economical and profitable.

This acre dressing contained:—

75 lbs. nitrate of soda;
75 lbs. double superphosphate;
40 lbs. sulphate of potash;

costing 32s. 6d., and giving a profit, after deducting the cost of the dressing, of 50s. 11d., due to the increase in the yield of maize over three years.

From the results of the first year's crop it was seen that nitrate of soda did not have a very appreciable effect upon the yield, and it was decided to recommend a reduction of the ingredient from 75 lbs. to 50 lbs. per acre. The cost of this modified dressing then became 28s. 6d. per acre.

It soon became the opinion of many maize growers that an outlay of 28s. 6d. per acre was rather high, and to meet this difficulty the dressing was proportionally reduced to one costing only 20s. per acre. It was thought advisable to test this new Rhodesia maize fertiliser dressing containing:—

25 lbs. nitrate of soda;
65 lbs. double superphosphate;
25 lbs. sulphate of potash;

and prove, if possible, if the reduction in amount per acre was justifiable. The results of the field test far exceeded our expectations, for no material increase in the maize crop was obtained by doubling the above dressing. The actual figures obtained are as follows:—

Per acre.	Yield of grain. lbs.
One dressing	3,293
One plus half dressing	3,108
Two dressing	3,320

A very definite point now had been gained in respect of the amount of fertiliser to use per acre. It had been previously shewn (1912-13-14) that the application of fertiliser is a profitable investment. It was thought advisable in the season 1914-15 to seek corroboration and substantiate this statement by conducting further systematic trials with the modified 20s. dressing. The figures given in the table are the results of this interesting work. It is seen at a glance that if Rhodesia maize fertiliser (as well as other dressings which will be explained later) be applied to maize on red soil the result is very satisfactory.

The table shews the increased yield of maize for the first season after the fertiliser was applied, and also the yields for the two following seasons when no further dressing was distributed. The figures are proof that the *residual* fertiliser has economic value. It is interesting to point out here that this *residual* value does not usually reach over till the fourth year after the application, and when the fourth year crop was reaped in 1915 there was seen to be, generally speaking, no increase over the "no manure" plot. From this we learn that the dressing is most economically applied once in three years.

In commenting on the introduction of basic slag and blood meal into a maize dressing (*vide* table), it is here remarked that although the previous maize fertiliser has given such excellent results, yet for obvious reasons it was thought desirable to extend our field of research. The acid character of superphosphate was replaced by the basic slag. This source of phosphates contains considerable quantities of lime, and it is seen that the red soils of Rhodesia do actually respond to this additional source of phosphates. Again, it is observed that blood meal has been mixed with nitrate of soda, and replacing a portion of it. This was done with the purpose of supplying the plant with sufficient nitrogen for its immediate use, and to have in reserve a slowly decomposing blood meal which the rains are unable to leach out of the soil, as in the case with

nitrate of soda. The nitrogen of the blood meal tends to become available to the plant for the second and third years' crops.

It has been observed that:—

It is reasonable to expect in normal seasons an increase of 5—6 bags of maize per acre above the yield on unmanured land for the first season after applying fertiliser.

An increase of over 13 bags, the aggregate of three seasons, can be obtained from one dressing of fertilisers costing 20s. (pre-war price).

Better results are obtained with fertilisers when the rains are not delayed after sowing.

Bad seasons do not affect adversely a fertilised crop of maize to the same extent as the unfertilised crop.

A manurial dressing effected an improvement in the size of cobs, and the proportion of good ears to nubbins was nearly double that on the unmanured plot.

With the aid of fertilisers it is possible to extend the planting season.

The yields obtained from *residual values* are not adversely affected by a bad rainy season to any appreciable degree. This is very marked in seasons 1915-16 and 1916-17.

In conclusion, it can be again stated with confidence that the judicious application of fertiliser is attended with very profitable results.

Farming in Granite Country.

REPORT AND ADVICE.

(A letter addressed to the Beatrice Road Farmers' Association.)

By R. C. Simmons.

Having recently had an opportunity of touring your district, I beg to submit, for the information of your members, the following report embodying my advice to them in reference to matters connected with live stock. As you are aware, I am not officially interested in agricultural matters, but agriculture and stock raising being so closely interdependent, it is impossible to treat of the one without the other. My views, therefore, are from a more or less general standpoint.

I am given to understand that at the time most of your members took up their farms it was generally considered that the land, or a fair proportion of it, was suitable for maize growing and tobacco culture, and that, consequently, the farms have been hitherto worked mainly on those lines, with cattle as a side issue only. Unfortunately your efforts have proved that as a maize proposition (in the sense that one understands the term in the Mazoe Valley for instance) the land in your district is unreliable. Tobacco culture has not been profitable, owing partly to the nature of the soil, and partly, no doubt, to certain commercial conditions. Personally, I am of opinion that, where the soil is suitable, tobacco (as a side line and not as a main crop) may yet be profitable, but at the moment your members are probably not prepared to take it up again. While your district is not one in which I would advise farmers to adopt agriculture as a main source of income, I am of opinion that it is exceedingly good stock veld, and that sufficient suit-

able crops to assist in maintaining good cattle in proper condition all the year round may easily be grown. My advice to your members, generally speaking, is to plough as little land as possible over and above what may be required to produce cattle feed and food for boys, and to look for their income directly from the live stock in some form or other and not from crops.

I would emphasise the fact that this advice applies in a general way only. There are farms and patches of land which no doubt in good seasons will yield a fair crop, but when such crops are realised, they must be regarded as a piece of good fortune over and above one's regular income, and must not be depended on. By reducing one's acreage, feeding the crop to stock and producing manure, it is very possible that much of the land which is now unprofitable to plough may become profitable. This factor intensifies the urgent necessity for abandoning maize growing (for sale as grain) at the earliest possible moment and concentrating one's energies on live stock. It is a fortunate circumstance that your members have in almost all cases paid some attention to cattle while attempting to make a living from maize growing, and they are consequently more or less in a position to act on the above advice, that is to say, they have cattle to start working with.

It is not an easy matter, perhaps, when one's liabilities run into hundreds, to abandon gambling in a maize crop in the hope of realising a few hundred bags. Ten or fifteen pounds a month from dairying appears such a very small drop in the ocean that one hesitates about seriously undertaking it. Maize growing in your district appears to me to be far from a fair or "sporting" gamble, whereas I believe an income from stock may be regarded as being practically certain. Your members have told me in a general way their position with regard to the purchase price of their farms and other main liabilities of that kind. I do not see the least hope of bettering the position whilst they continue to rely on the maize crop. The comparatively small but regular income which may be made by working the stock properly and economically will tend gradually to improve the position; it will improve the credit of the district and of individuals. It will provide a monthly income against household expenses and wages, and a system

of mixed farming with stock as the main object will materially improve the quality of the soil, and hence the value of the farm. I have mentioned dairying because, where it is necessary to provide a monthly income, dairying is the only form of stock farming by which such an income may be assured in the earlier stages. When opportunities occur of earning a living outside farming proper, such as store-keeping or transport riding, I would not necessarily urge dairying, but rather the careful development of a beef herd, and possibly stud breeding on a small scale. The farmer, working 1,500 or 3,000 morgen, as distinct from the rancher, must grow crops of some sort. If he cannot grow crops which are saleable in the raw form, he must grow something that he can turn into dairy products, such as milk, butter, cream, bacon, eggs, etc., or into valuable cattle, such as stud bulls, or (looking a little ahead perhaps) into high-class prime beef. For this purpose he must have a better class of cattle; he cannot afford to rely solely on ranch cattle, because they will not utilise his crops economically, and he cannot run enough of them. He may run some cattle on these lines, but he must be continually improving every beast on his farm until eventually he has nothing but pure-bred or very high-grade cattle. The majority of the herds I saw contained a number of cattle quite worth farming as dairy cattle. They will perhaps not give large quantities of milk, but they will give a rich milk, and will repay housing, bedding and feeding on cheap feeds during the winter.

The old South African custom of milking in an open kraal and of taking a little milk here and there from all or any of the cows in the herd may have served a useful purpose in the past, but the man who wishes to dairy on business lines, however small his business, must put that old system behind him once and for all.

The principal objection put forward against dairying is that the calves suffer. Now, obviously, one cannot eat one's cake and have it. One cannot grow the same quality of calf on half a ration as one may expect to produce on a full ration of milk. Under the old system, when any appreciable milk business is being done, the calves undoubtedly suffer. The only way to obviate the trouble is to feed the cows and help

them to produce more milk, and to arrange one's business so that each cow may be carefully supervised, and each calf requiring it may have its ration supplemented by skim milk and gruel. I do not contend for a moment that a calf fed under this system will be as good as one which is allowed all its mother's milk in a natural way, but it is quite possible to have strong healthy calves.

I recommend such of your members as find it necessary to take up dairying to select from 15 to 30 of their best milking cows, and to put them in a herd by themselves to be treated as dairy cattle. The balance of the herd should be run on beef-raising lines.

The following notes may possibly be of assistance in arriving at a suitable plan of action. I will deal with the dairy herd first:—

Selection of Cows.—In mixed herds one cannot always rely on the conformation of a cow as an indication of her milking qualities, but, generally speaking, those cows having the finer and more delicate lines and the more highly developed nervous system, which is usually associated with milk production, will pay best for care and attention. The term "finer and more delicate lines" must not be confused with weediness. Assuming that the more highly bred bull will be used with the dairy cows, all cows or heifers shewing any want of constitution should be left with the beef herd, and mated with big, strong grade bulls rather than with thoroughbreds.

Selection of Bull.—It is not always easy, on a small farm, to run two breeds or two types of cattle. Moreover, at the present time it is very difficult to obtain suitable bulls. Notwithstanding these difficulties, I would impress upon your members the necessity for farming the dairy herd properly and to the best of their ability. Half measures usually spell failure. Everything that can be done towards improving the herd for dairy purposes should be done, and above all one should not, on the average Rhodesian farm, try to have a good hardy beef beast and a first-class milker in the same individual animal. The dual purpose animal, so called, undoubtedly has its uses in some countries, and in rich intensively farmed districts, but the Rhodesian farmer will be wise if he limits his

aspirations in this line to obtaining a first-class milk breed, the steers from which will give a reasonable carcase, and be worth looking after to some extent. The bull then which is used with the dairy herd, whether grade or pure, should be of a dairy breed, from a good milking herd, and above all be the son of a good milch cow. He should have depth of chest, good girth and other signs of a strong constitution, and a neat but masculine head. In the grade bull, other things being satisfactory, one need not be greatly troubled if the hindquarters are a little light. Few grade bulls are perfect, and it is better to sacrifice conformation of the hindquarters than to use a bull wanting in girth and heart room.

System of Breeding.—In order to encourage the maternal qualities of the dairy heifer, she should be bred at as early an age as possible without seriously interfering with her growth. The calves and heifers should never be neglected, and should be in strong good order at 18 or 20 months, when they may be put to the bull. If for any reason a heifer is not strong, the date of putting to the bull may be deferred. The dairyman requires cows to be calving all the year round, but his autumn calvers will pay him best. In the case of a cow that calves in April or May, one should have no trouble in seeing both her and her calf safely through the winter. She will be milking at a time when cream realises the highest price, and her calf will wean off on to the grass in January. Cows calving in autumn that are well fed and tended through the winter usually spring afresh with the grass, and yield a greater amount of milk for the total milking period than if they calve in the spring.

Housing.—Protection from cold winds, driving rains and hot sun is essential to the dairy cow. Warm bedding at night in the winter months greatly increases cream production. Shedding may be of the cheapest description, but it should be clean, light and airy, free from draughts and on dry ground.

Feeding.—Feeding is an art that is most difficult to teach by means of literature or correspondence. Animals have an individuality much the same as human beings, and indeed the farmer who fails to recognise this fact will never be a successful stockman. I do not contend that all the cattle which may be selected for the dairy herds will pay for high feeding, or for

feeding for any considerable portion of the year. The farmer must adopt a process of gradual elimination of the robber cow to be replaced by those that pay for their feed. In the initial stages he must not overlook the fact that the half-bred or even native cow yielding a small quantity of milk often gives a comparatively large yield of butter fat, and for a slight expenditure in rough cheap food and a little care in the matter of housing, her milking period may be considerably lengthened; in other words, she pays for her feed and leaves something over for the farmer. Taking the average of the better class cows in your district, and in order to guide you in making provision for the winter season, I recommend the following scale of rations for cows in milk:—

May—

3—5 lbs. of crushed and soaked maize.
3—5 lbs. ground nut vine.
Veld hay or maize stalks as required.

June—

3—5 lbs. crushed and soaked maize.
3—5 lbs. ground nut vine.
10—25 lbs. ensilage, majordas or other green food.
Veld hay and maize stalks as required.

July, August, September—

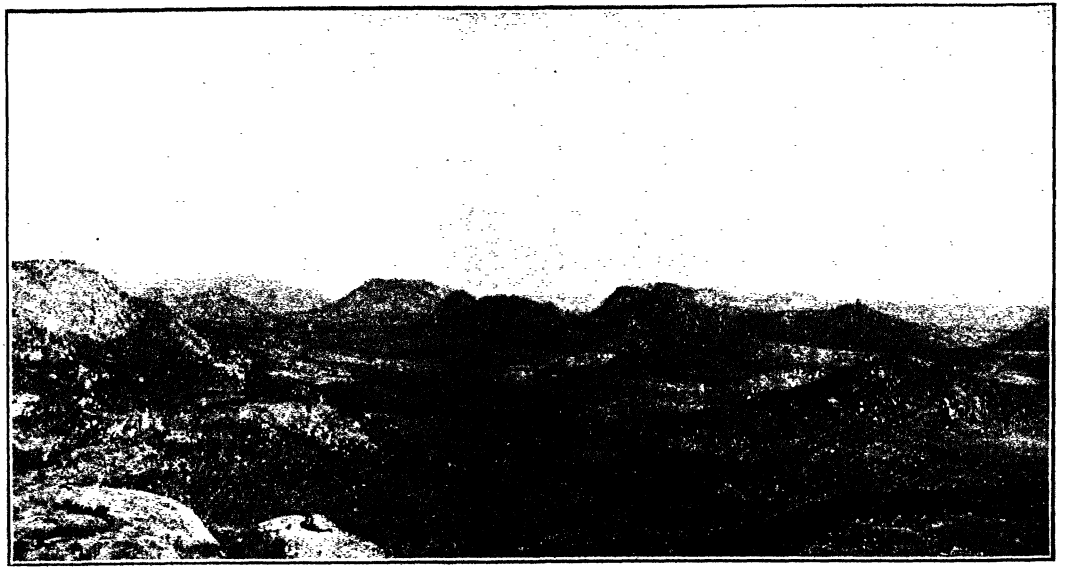
3—5 lbs. crushed and soaked maize.
1—2 lbs. ground nuts.
15—30 lbs. ensilage, majordas or other green food.
Veld hay or maize stover as required.

October, November, December, January—

Gradually slacken off all feeds except a portion of the maize; this will be found very beneficial in the time of green washy veld, and may be continued until January.

February, March, April—

Very little should be required in addition to the veld, but the farmer must use his discretion, according to the season and the condition of the veld. Green maize stalks, Napier fodder, potatoes and so forth may be utilised if necessary.



Typical granite country. View from Forest Hill, Makoni.

Now, with a dairy herd of 30 cows, one will be fortunate if one has 20 in milk during the drier part of the year; then again, with your present herds, some of the cows will hardly require the full ration indicated. If, therefore, one reckons to have a full ration for 20 cows, I think one may feel on the safe side. In order to secure this, one will need to grow approximately:—

Maize	100 bags.
Maize ensilage or majordas	40 tons.
Ground nuts	50 bags.

Taking your average crops on your best land as being:—

Maize (for grain)	2½ bags per acre.
Maize (for silage)	3 tons per acre.
Ground nuts	7 bags per acre.
Majordas	2 tons per acre.

It will be necessary to cultivate exclusively for your milch cows and their calves and young stock:—

Maize	40 acres.
Maize ensilage	10 acres.
Majordas	5 acres.
Ground nuts	8 acres.
Total	63 acres.

A little over 3 acres per cow in milk, or a little over 2 acres for every adult cow in the herd. The maize stover and ground nut vine would, of course, be reaped off the above ground, and need not be reckoned as extra acreage.

Method of Feeding.—Clean mangers should be provided. Feeding in old boxes or old sheets of iron on the ground is wasteful and unsatisfactory. I strongly recommend tying up every cow to feed. In the winter months they are certainly best tied up all night in the shed. In warmer seasons, if good sheltered grazing is near at hand, they may be quite as well out at night, in which case they should be tied up to feed and again loosed. The feed should be in the mangers ready for them when the cows come in at sundown, and the morning's feed should be mixed ready over-night, so that it can be given

without delay at sunrise. The feed should be distributed as follows:—

Morning: Grain.
Succulent food.

Evening: Grain.
Succulent food, followed by stover or hay to rack up with.

MILKING.—This is perhaps the dairyman's greatest difficulty, unless he or some member of his family can be present at every milking. I recommend training one boy (preferably a Bureau boy) to be cow-man. He should feed, tie up all cows, clean the buildings and dairy utensils, and be responsible for everything except the actual milking. For the actual milking other farm hands should be utilised under his supervision. In no branch of farming is it so essential to systematise the work as in dairying. All work should be done by the clock. Natives learn systematic methods much quicker and easier than when things are done in a casual and slipshod manner. The farmer is seldom noted for system and organisation in his work. He should endeavour to improve himself in this respect, and he will find it easier to work his native labourer.

THE PIG AND THE DAIRY HERD.—When one is running a cream or butter trade, the disposal of the skim milk is a most important item. A considerable portion of it will be utilised for calf feeding, but at times there is sure to be a quantity of it over and above what is required for calves. This is best utilised for pig feeding. In this respect the dairyman must exercise forethought. It is just as easy to arrange for one's sows to farrow at a time when food for them and for their young pigs will be abundant as to have them farrowing at any odd time of the year. The dairyman should be able to keep a few pigs feeding all the year round, but he will be well advised to allow his sows to be idle for six months rather than allow them to farrow at a time when he cannot give the necessary attention to the pigs. While the dairyman may often carry on a profitable business in thoroughbred stud pigs, I will assume that in most cases he will be feeding for bacon purposes. He will have a number of cows calving down in April or May. He will also have his maize crop in at that time. He will be

able to feed skim milk with the maize to his fattening pigs, and to get them quickly off his hands. If, therefore, his sows farrow in January, he will have four-months-old pigs just ready to force along on maize at the time he has the maize and skim milk to do it with. Such pigs should be away and off his hands by September. The sow that has weaned her pigs by the end of March may be served again, say, at the end of May. This means that she will farrow in October, when one may again expect green grass, skim milk and other necessaries for bringing up a young litter of pigs satisfactorily. The dates suggested are merely to illustrate the point. The individual farmer will know what times of the year suit his particular circumstances.

Transport of Dairy Produce to Market.—With a main transport road running practically through the centre of your district, you are not badly situated as regards transport for cream and other produce of that kind. I would merely remind you that the transport question should not in any case be a bar to dairying. I shall be glad at any time, if desired, to assist you to organise cheap co-operative transport on lines which have been proved satisfactory in districts similar to your own.

The Beef Herd.—Just at the moment it is not particularly easy to sell beef animals; nevertheless the general outlook in connection with the beef industry justifies the farmer in making some preparation for a better time in the near future, and he must remember that unless he begins soon he will probably be behindhand when better times do arrive. The beef herd on a farm must, as previously indicated, be something better than a mere ranching herd. In the course of making adequate provision for his dairy herd, the farmer will produce quite a lot of surplus feed, which may be used with advantage for his beef herd. He may also plough a little extra ground for them, with a view to providing ensilage. He will never milk the beef herd. Calves will have all their mothers' milk. With reasonable care and judgment in the management of the grazing, the adult animals should seldom require any supplementary feed. Nevertheless veld fires and droughts will occur, and it is the farmer who takes steps to avoid the former and to be prepared for either that will be most successful. I recommend making some provision every year in the form of a rough

kraal and shed into which any weaner, young calf or other animal may be put immediately it appears to be not doing too well, and may be fed at nights. Such feed as ensilage, maize stover, ground nut vine, sweet potatoes, pumpkins and the like will probably suffice. By such a method the stamina and physique of the herd will be built up, and every year fewer animals will require assistance.

SELECTION OF THE COW.—The selection of the cow for the beef herd is not such a difficult matter as the selection for dairy purposes. In practice, all that are not suitable for dairying will remain in the beef herd. Nevertheless one needs to know and to have fixed in one's mind's eye the kind of animal that one is breeding for, and to be very careful when drafting or selling heifers never to sell the kind one requires and which one ought to keep.

At the commencement stamina and constitution should be the principal watchwords of the breeder. The finest qualities in the world are useless without stamina. The cows to keep in the beef herd are those of a more blocky, square type, with broad, short heads, fairly thick necks sloping gradually into the shoulders, deep chests, good girth and good over the crops and behind the shoulder. If these points are carefully attended to, the rest of the desirable qualities will follow with ordinary care and attention in the selection of bulls.

SELECTION OF BULL.—As in the selection of the cow, so stamina, constitution and masculine character must be the leading points in the bull. He should be wide, deep and low, and not too split up in the hindquarters. He should be a good doer. An unthrifty bull is not likely to impart thrift to his progeny. Except in the case of a first cross on small native cows, when half-bred Fries-Africander bulls are to be recommended, the bull with the beef herd should be free of dairy blood; that is to say, he should be a grade or cross of one of the recognised beef breeds with the Africander or native.

SYSTEM OF BREEDING.—The beef heifer should not be served until she is a full two years old, in order to develop her frame to the fullest. The separation of the young heifers from the bull on small farms is not always an easy matter; its importance, however, justifies every effort being exercised to pre-

vent heifers being bred at too young an age. No bull should be used that is not quite fit and well. He should not be over fat, but he should be muscular, and gaining flesh rather than losing it.

The time of calving should be regulated in accordance with those months in the year which are found to be most suitable, and the bull should be taken out of the herd during those times that his services are not desirable. October and November and March and April are generally considered the best months for calving. Provided a bull is fit and mature, he will serve about 40 cows satisfactorily. I am aware that in many cases bulls serve far more. In most instances in which bulls have served appreciably more than 40 cows I have had reason to doubt the wisdom of allowing him to do so, on account of the tendency to decrease the stamina of the herd.

Stud Breeding.—The ultimate object of the beef herd is to produce bulls and cows which may be sold as stud stock to the ranchers proper. So soon as the farmer is able, he should purchase a pure-bred beef bull and a few heifers, in order that he may breed a few pure-bred bulls in addition to grade bulls. In the winter such pure-bred female stock with their progeny might easily be run with the dairy herd for supervision and feed, thus saving extra labour.

Breeds Recommended.—The farmer is often compelled to use grade and cross-bred bulls, but this should be no reason for not making up his mind what sort of cattle he wants, and using those grade bulls which are more nearly what he requires, instead of any animal that happens to come along. That is to say, if he has chosen Hereford as the breed most likely to suit him, but cannot get a pure-bred bull, let him, if possible, use a Hereford-Africander or a Hereford-native, or say a Hereford-Devon (the Devon being nearly related to the Hereford), and try to avoid getting Shorthorn, Ayrshire, Friesland and other kinds of dairy blood into the herd. Your district is good enough to carry almost any of the breeds generally used in Rhodesia, and, within quite wide limits, the choice is a matter of individual taste. The one point on which one must be careful, however, is not to confuse the beef with the dairy breeds.

My recommendation in order as written is as follows:—

Dairy Breeds—

1. Dairy Shorthorn.
2. Ayrshire.
3. North Devon.

Beef Breeds—

1. North Devon (beef strain).
2. Hereford.
3. Sussex.
4. Shorthorn (beef type).
5. Polled Angus.

Conclusion.—In conclusion, I would remind you that it is not possible in a report of this nature to do more than touch on the various phases of the cattle business. I have endeavoured to indicate the more important points for study and attention, and I would earnestly recommend your members to provide themselves with literature treating in detail on these points. I shall be glad at any time to correspond with your members or to see them, when I am at headquarters, if they will ring up or call at my office.

While stock farming is possibly not so strenuous as agriculture, when the latter is conducted on a large scale, I would remind your members that it nevertheless calls for constant thought and supervision, and it is by no means a business that will take care of itself.

As bearing on some of the various points mentioned in the foregoing, I would ask your members to read the following bulletins which have appeared from time to time in the pages of the *Agricultural Journal*, and which will be supplied free of charge on application to the Director of Agriculture, Salisbury:—

No. 190.—The Principle of the Winter Feeding of Cattle.
Reprinted from the October, 1914, number of the *Journal*.

No. 203.—Ensilage and the Feeding of Ensilage to Dairy Cattle in Winter.
Reprinted from the February, 1915, *Journal*.

No. 243.—Shedding for Milch Cows on Rhodesian Farms.

Reprinted from the October, 1916, *Journal.*

No. 184.—Cream, its Separation, Handling and Sale to Butter Factories.

Reprinted from the June, 1914, *Journal.*

No. 211.—The Fattening of Pigs on Granite Farms in Mashonaland.

Reprinted from the June, 1915, *Journal.*

No. 229.—The Breeding and Feeding of Pigs for Bacon Factory Purposes.

Reprinted from the April, 1916, *Journal.*

No. 210.—The Care and Feeding of Calves in Dairy and Stud Herds.

Reprinted from the June, 1915, *Journal.*

The Market for Sunflowers.

ADVICE FROM THE IMPERIAL INSTITUTE.

A steady increase has been observed during recent years, as shewn by the agricultural statistical returns, in the acreage of sunflowers sown in this country. Last year 1,766 acres of sunflowers were planted, and the seed crop harvested exceeded 500 tons, the average yield being about 580 lbs. per acre for the past two years, whilst it averaged over 800 lbs. in districts best suited to the crop. This year it is probable that the acreage was even larger, but the amount of the yield is not yet known, and may have been somewhat affected by the erratic season. The quality of sunflower seed sent from Rhodesia to London has been the subject of very gratifying reports from time to time, and the possibility of growing this crop on a field scale has been abundantly demonstrated. At present our only anxiety is to find remunerative outlets for this crop. Prior to the war the normal price was about £8 10s. per ton, but it seems reasonable to anticipate that for some years to come at least higher figures should be obtainable.

Certain enquiries were lately addressed on this subject to the Director of the Imperial Institute at South Kensington, and the value and usefulness of that Institute to us is well illustrated by the practical information they have obtained on our behalf, and placed at our disposal in the reports we print below, which will be appreciated by all interested in the subject. The replies sufficiently indicate the nature of the questions put, which need not therefore be repeated.

Imperial Institute
of the
United Kingdom, the Colonies and India.

South Kensington,
London, S.W.,
7th June, 1917.

Sir,

I have to acknowledge the receipt of your letter C.6b/217 of the 28th March last with reference to the disposal of supplies of sunflower seed from Rhodesia.

I have made enquiries among oil-seed crushers and brokers in London, from which it appears that there is a ready market for sunflower seed in this country. An important firm of brokers state that Rhodesian sunflower seed is well known on the London market, and that they would have no difficulty in placing a shipment of 500 tons, which is approximately the quantity you mention as having been harvested last season.

A firm of oil-seed crushers state that the above quantity, or even ten times that amount, would be absorbed with the greatest readiness.

It is not possible to state the probable value of the seed in the absence of a sample, and all oil-seeds are at present liable to considerable fluctuations in price. The firm of brokers referred to above state, however, that assuming the seed to be equal in quality to previous deliveries from Rhodesia, the present value would be about £20 per ton.

It would appear from these statements that there would be no difficulty in disposing of a larger quantity of Rhodesian sunflower seed in this country next year, provided that freight is available.

Sunflower seed yields an oil of very good quality, but the cake does not command a high price, owing to the large percentage of fibre which it contains. There is also a small outlet for the seed as a bird food, especially, it is stated, for feeding parrots.

Consignments of the seed might be offered in London through the following firms:—

The Produce Brokers Company, Ltd.,
Exchange Buildings,
St. Mary Axe, London, E.C.

Fairclough, Dodd & Jones,
46, St. Mary Axe, London, E.C.

If, however, you would prefer to consign a shipment of the seed to the Imperial Institute in the first instance, I shall be glad to make arrangements for its sale through one of the above-mentioned firms, if you will forward the bill of lading to me.

I am, Sir,
Your obedient servant,

(Sgd.) WYNDHAM R. DUNSTAN.

The Director of Agriculture,
Salisbury,
Rhodesia.

Imperial Institute
of the
United Kingdom, the Colonies and India.

INTERIM REPORT ON SUNFLOWER STEMS FROM RHODESIA.

The sample of sunflower stems which is the subject of this report was forwarded to the Imperial Institute, through the British South Africa Co., by the Director of Agriculture at Salisbury.

It was desired to ascertain whether the pith contained in the stems would find a market in the United Kingdom, and especially whether it was suitable for such purposes as the manufacture of buoyant life-saving apparatus and for packing in the sheathing of ships.

DESCRIPTION OF SAMPLE.

The sample weighed 67 lbs., and consisted of the main stems of the sunflower plant, measuring about 6 feet in length, about $1\frac{1}{2}$ to $1\frac{3}{4}$ inch in diameter at the root, and $\frac{1}{2}$ to $\frac{3}{4}$ inch at the top. The central portion of the stems was filled with a firm white pith.

RESULTS OF EXAMINATION.

1. *Pith.*—The stems were found to contain 18 per cent. of their weight of pith, which had a specific gravity of 0.043, *i.e.*, it was about four times as light as cork. A portion of the pith after being completely immersed in water for 12 days was not completely water-logged, although at the end of that period it only just floated.

On ignition the pith burned without any flame, and smouldered slowly.

As compared with "sola" pith, derived from *Æschynomene aspera* from India, which is used for sun helmets, the present material had a slightly greater specific gravity (0.043 as compared with 0.040), and it was much firmer. "Sola" pith burns rapidly on ignition.

The pith was analysed, with the following results, which are shewn in comparison with the figures recorded for maize and elder pith:—

	Sunflower Pith (present sample).		Maize Pith.			Elder Pith.
Yield of pith from stems	18 per cent.		20 per cent.			...
	(A)	(B)	(C)	(D)	(E)	(F)
Moisture in pith as received	% 9·3	% 10·8	...	...	...	...
Constituents of the dry pith:—						
Ash	18·6	20·2	3·0	4·5	4·5	1·9
Protein (crude) ...	3·4	...	3·8	3·5	3·3	2·5
Fat	1·1	...	1·2	5·6	1·4	1·2
Carbohydrates (digestible)	55·1	...	47·4	52·8	48·4	25·3
Crude fibre	21·8†	...	44·6	33·6†	42·4	69·1
Matter soluble in hot water	...	34·8	...	...	...	...
Cellulose	...	29·3†	...	51·6†	39·9‡	41·9‡
Nitration, loss on ...	...	21·0	...	...	...	...

Note.—(A) and (B) in the above table represent two different portions of pith, each taken from a few stems of the present sample.

† The fact that the percentage of cellulose in these cases is higher than the percentage of crude fibre is to be attributed to the loss of material due to hydrolysis by boiling with acid in the determination of the percentage of crude fibre.

‡ Determinations on crude fibre residue.

From the above figures it will be seen that sunflower pith is somewhat similar in composition to maize pith, but it contains a much larger amount of ash and less cellulose. It should have a higher feeding value than maize pith, but it cannot be recommended for use in feeding stuffs without trial, in view of the American experience that the feeding value of maize *stalks* is in practice improved by the removal of the pith, which is less digestible than the remainder of the stalk, and is objectionable on account of its high absorptive properties (U.S. Dept. of Agric., Division of Chemistry, Bulletin No. 50, p. 27). It is, however, by no means certain that a satisfactory feeding stuff cannot be prepared from it (see below).

It has been suggested in the United States that piths of this type might be employed as sources of cellulose products, including explosives, but it is clear from the foregoing results that this sunflower pith would be of little value for such purposes, partly owing to the physical character of the pith, but chiefly owing to its low yield of cellulose. The materials commonly employed as sources of cellulose are waste cotton (after careful purification) and wood, both of which are cheaper and more convenient to handle than this pith, and give higher yields.

Samples of the pith were submitted to manufacturers of explosives and of pith helmets, with the following results:—

(1) The explosives manufacturers stated that the pith possessed no absorptive power for nitro-glycerine, and would therefore be of no interest to the explosives industry from that point of view as a substitute for wood-flour. As a combustible ingredient of a composite explosive it might, however, possess advantages over other carbonaceous materials now in use, but this could only be determined by practical trial. If the pith were found suitable for this purpose, its value in the United Kingdom in normal times would probably be between £3 and £6 per ton.

(2) A firm of pith helmet manufacturers stated that the fibre of the present sample was too short and too brittle to be used in place of the imported pith (sola pith) used in their works. They proposed, however, to make experiments with the

material, and to inform the Imperial Institute later on if any useful results were obtained.

Other possible uses of the material are being investigated, and a further report on the results will be forwarded in due course.

2. *Entire Stems.*—The whole stems were chopped up and submitted to treatment at the Imperial Institute similar to that employed in paper mills for the production of paper pulp. The following conditions of experiment were found necessary for the production of pulp:—

	Caustic soda used.		Conditions of boiling.		Soda consumption per 100 parts of stems.	Yield of dry pulp expressed on the stems as received.
	Parts per 100 parts of stems.	Parts per 100 parts of solution.	Time.	Temperature.		
						Per cent.
A.	18	4	6 hours	150° C.	16	38
B.	22	4	6 hours	150° C	17	37

The pulp thus obtained was of dark colour, and yielding a fairly tough, opaque, parchment-like paper of fair quality, which shrunk a good deal on drying. The pulp did not bleach to a pure white colour, and even when much larger quantities of bleaching chemicals were used than could be employed on a commercial scale, it only yielded a yellowish paper. The use of a larger quantity of caustic soda did not improve the quality of the pulp.

With a view to ascertaining whether the removal of the pith would improve the quality of the pulp, the stems were chopped and the pith removed as far as possible by scraping and winnowing. On a practical scale the greater part of the pith could be removed by merely winnowing the stems after chopping. The woody material thus obtained gave the following results:—

	Caustic soda used.		Conditions of boiling.		Soda consumption per 100 parts of stems.	Yield of dry pulp.
	Parts per 100 parts of stems.	Parts per 100 parts of solution.	Time.	Temperature.		
						Per cent.
(a)	18	4	8 hours	150° C.	(a) 17	44
	14·76				(b) 14	36

(a) Expressed on the weight of stems used, with pith removed.
(b) Expressed on the weight of entire stems used.

The paper thus produced from the stems freed from pith is distinctly superior to that yielded by the whole stems. The pulp, however, shewed the same characteristics when attempts were made to bleach it.

3. *Ash from the Stems.*—The stems, as received, contained 10.3 per cent. of moisture, and yielding 10.7 per cent. of ash, which had the following composition:—

Potash (K_2O), 49.6 per cent.
Soda (Na_2O), 2.3 per cent.
Phosphoric acid (P_2O_5), 1.5 per cent.

The dry stems must, therefore, contain nearly 5 per cent. of their weight of potash, and if chopped up fine and used as a manure, they would be a useful source of potash, in addition to supplying humus and a small amount of phosphoric acid and nitrogen to the soil. The fact that sunflower stems are rich in potash is well known, and in Southern Russia, where sunflowers are grown on a large scale for the production of seed, the stems are burned, and the ash used for the production of potash. This Russian potash industry, which is of considerable importance commercially, is described in a pamphlet on "The World's Supply of Potash," published by the Imperial Institute, a copy of which is sent herewith. Since the war, the United Kingdom has imported considerable supplies of potash made in this way in Russia. During the war, and until

a better method of disposing of the sunflower stems has been discovered, the stems might well be burned in Rhodesia, and either the ash or crude potash made from it exported to the United Kingdom. This question should be investigated in conjunction with that of preparing potash by lixiviation of certain rocks, which is dealt with in the following recent reports by the Imperial Institute on Rhodesian materials:—

Report on Saltpetre Rock, dated 26th October, 1916.
Report on Saline Material, dated 21st May, 1917.

The plant required will be much the same in all three cases.

If it is considered feasible to utilise the stems in this way, the Imperial Institute will be glad to have a sample of a few pounds of the ash for examination and commercial valuation.

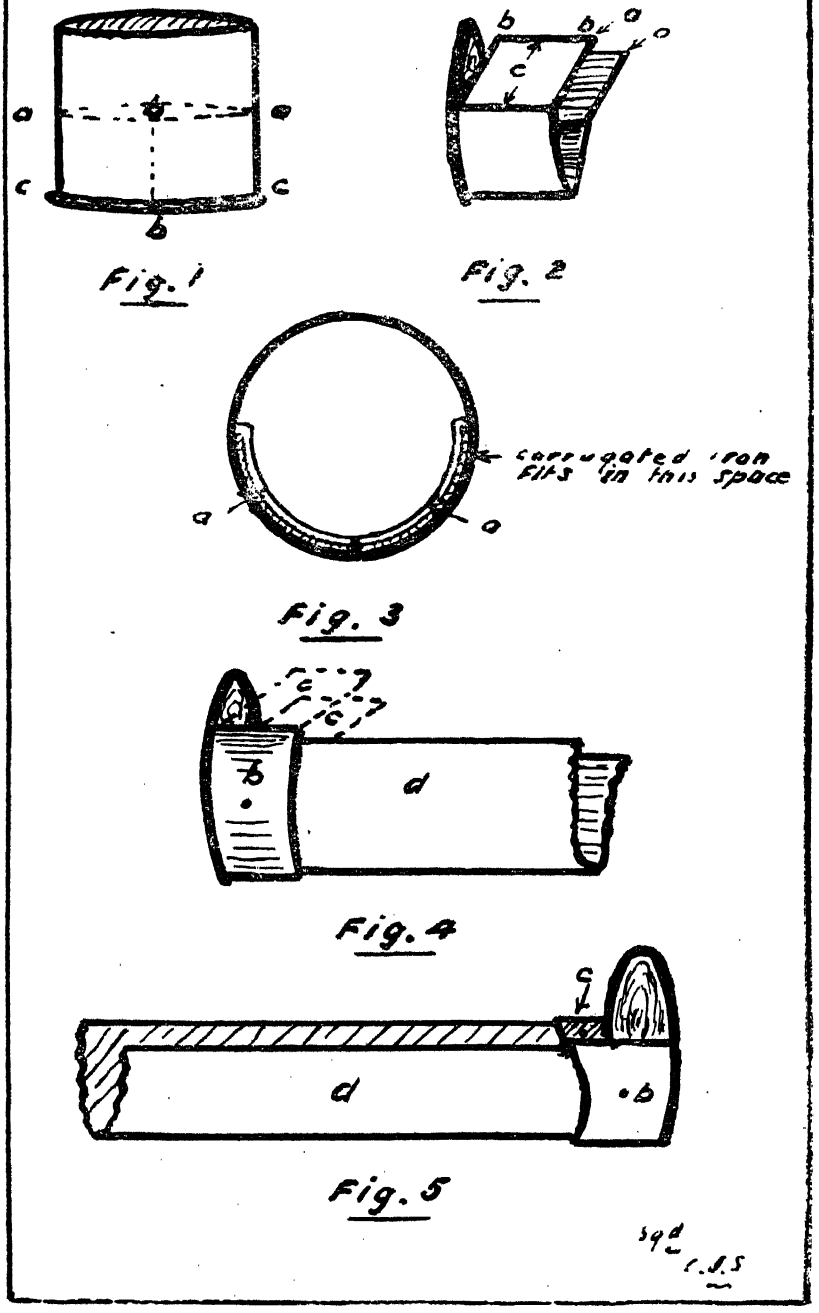
SUMMARY AND CONCLUSIONS.

1. *Pith.*—Practically the only industrial purpose to which plant pith is applied at the present time is in the manufacture of pith helmets. For this purpose sunflower pith appears to be less suitable than the sola pith now employed, but further enquiries on this point are being made. The pith cannot be employed as a substitute for wood and cotton for the preparation of cellulose, owing to its low yield of cellulose and its physical condition. It is not a promising material for packing in the sheathing of ships and for stuffing life-saving appliances for use at sea, but enquiries are now in progress with a view to testing the feasibility of its use for these purposes.

Maize pith has been regarded as unsuitable for use in feeding stuffs, owing to its indigestibility and its high absorptive capacity for fluids. No experiments appear to have been made with feeding stuffs containing sunflower pith, and it would appear to be worth while to try such experiments in Rhodesia. The pith would probably be greatly improved for this purpose if it were ground and mixed with molasses, to make a material similar to the feeding stuffs now largely used which are made by mixing molasses with the soft inner portion of the sugar cane.

2. *Whole Stems.*—When the pith is removed the stems give a good yield of pulp, which, however, cannot be satisfactorily bleached, and is only suitable for the manufacture of common brown paper. The best method of using the stems at present would appear to be either to chop them finely for use as a manure, since they contain nearly 5 per cent. of potash, or to burn them and use the ash, which contains nearly 50 per cent. of its weight of potash, as a rich potash manure, or employ it for the extraction of crude potash as is now done in Russia.

6th June, 1917.



A cheap iron trough.

An Easy Method of Making an Iron Trough for Cattle or Pigs.

By C. J. SHIRLEY, Manor Farm, Bromley.

Take an old piece of corrugated iron and hammer it out flat. Then turn the edges over about two to three inches; hammer flat. This prevents the animals from getting cut, and strengthens the edge and side of trough. Now for the ends. Get two old drums of the same size in circumference, the most suitable being cement drums or large oil drums. Now cut the drum in half, as per dotted line a, a in Fig. I. of the diagram. Then cut downwards from b to b; now half way round the drum from c to c.

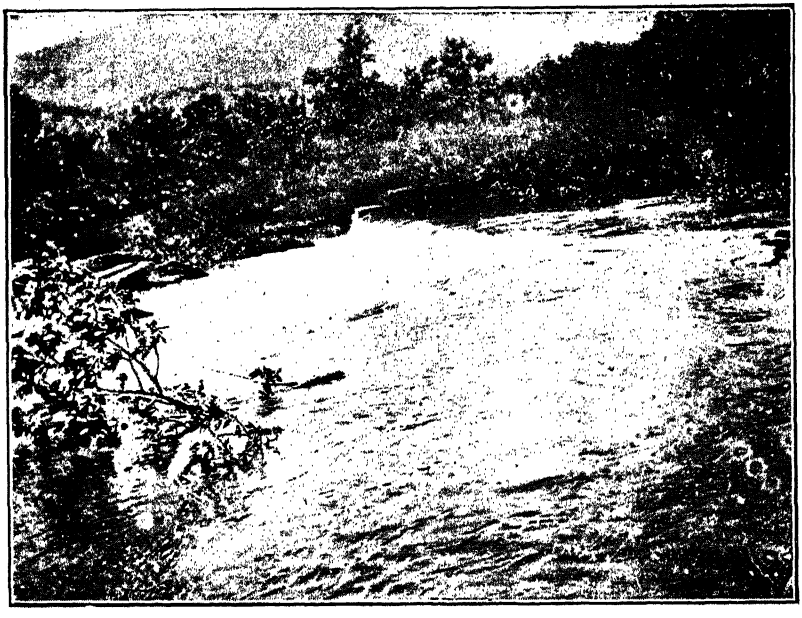
Fig. II. indicates the parts cut—c, c and from b, b; these parts a are bent down *inside* (Fig. III., a, a).

Now take your sheet of iron, bend it as in Fig. IV., d, and place the end inside portion of drum b, bend over c (which is a in Fig. III.), and hammer down well inside. You now either drill or punch three rivet holes right through the three thicknesses of metal, as Fig. V., b. Riveting can be done with ordinary roofing washers and 3 inch nails cut short, about ½ inch in length.

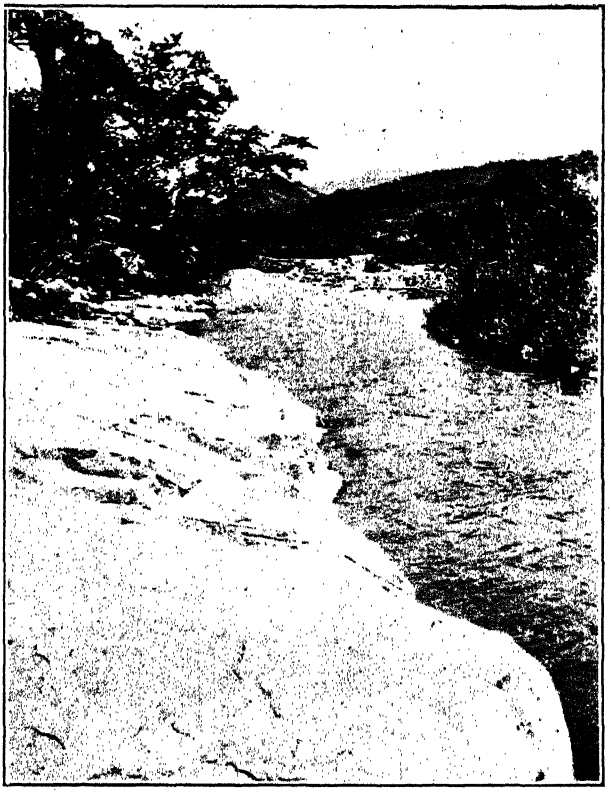
Odzani River Irrigation Scheme, Umtali District.

By W. M. Watt, Agricultural Engineer.

Most irrigation schemes in this country have so far only embraced comparatively small areas. Such is not the case, however, as regards the Odzani irrigation scheme, which commands an extent of about 3,000 acres, of which 1,000 acres at least can be classed as good irrigable land, most of which is eminently suitable for citrus culture. The works consist of a furrow about 20 miles long, which is taken out from the Odzani River by a diversion weir constructed of masonry. The weir has a maximum height of about 8 feet, and was built of granite blocks, which were laid so as to break joint all ways. The blocks were laid in cement mortar, consisting of a mixture of 2 of sand to 1 of cement. The upstream face of the weir is perpendicular, the top width is 2 feet, and the downstream face has a batter of 4 to 1. Photograph No. 1 shews the weir across the river over-topped by a small flood. Photograph No. 2 shews the intake of the furrow a short distance below the weir. This section to the regulating gate, shewn on photograph No. 3, was blasted through solid granite, the same rock as constituted the foundations for the weir. The lower side of the furrow was trimmed off to the same level as the crest of the weir by blasting, or, where necessary, by erecting a walling of masonry or concrete. The regulating sluice gate shewn on photograph No. 3 is constructed of timber 2 inches thick clamped by flat iron bars riveted and counter sunk. It is raised and lowered by means of a screw 1 inch diameter, with square threads (4 to the inch), worked by a handle at the top of the gate, the whole of which structure is above the highest anticipated flood level.



Odzani Furrow—No. 1. The weir during flood.





Odzani Furrow—No. 3. Regulating gate and head works. Mr. Fairbridge and grandchildren.



Odzani Furrow—No. 4. Flume crossing depression.

All the works between the weir and the regulating gate have been constructed of such a nature as to permit the highest floods to pass over without damage. Immediately above the regulating gate a scour sluice gate has been erected, which, when over-topped in flood time, automatically drops, and allows free circulation of the water in this section, and prevents the deposition of silt against the regulating gate. Provision is made to deal with storm water entering the furrow below the regulating sluice gate throughout its full length, by the construction of a number of spillways made of dry stone pitching. These spillways vary from 50 to 100 feet in width, and their crest level corresponds with the full supply level of the water in the furrow, thus preventing the breaching of the unprotected banks. The spillways are placed about one-half to one mile apart, according to the topography of the country. In a few cases it was necessary to cross certain depressions by means of flumes; the type of flume adopted is illustrated in photographs Nos. 4 and 5. These flumes are constructed of galvanised iron with runners of angle iron; they are held together by wrought iron straps, and are laid on cast iron saddles supported by pins of native timber. To allow for contraction and expansion, expansion joints were provided for at both ends, and although of rather an experimental type, have proved satisfactory.

Photograph No. 6 shews the only deep cutting of any consequence that was encountered in the course of the work, this having been undertaken in order to avoid a very circuitous route through difficult steep sidelong and rocky country on Mr. Fairbridge's farm "Kingsley."

Photograph No. 7 shews the furrow in fairly normal conditions. Owing to the comparatively steep slope of the valley, the furrow very quickly gets into the hillside, and it was consequently found desirable, in order to prevent the heavy rock work excavation, to institute a series of drops. This was carried out without the loss of any irrigable land. The total amount of fall available from these drops along the length of the furrow is approximately 200 feet, all of which is available for power purposes without detriment to the irrigation of the lands commanded. One of these drops on Mr. Fairbridge's farm "Kingsley" is illustrated on photograph No. 8.

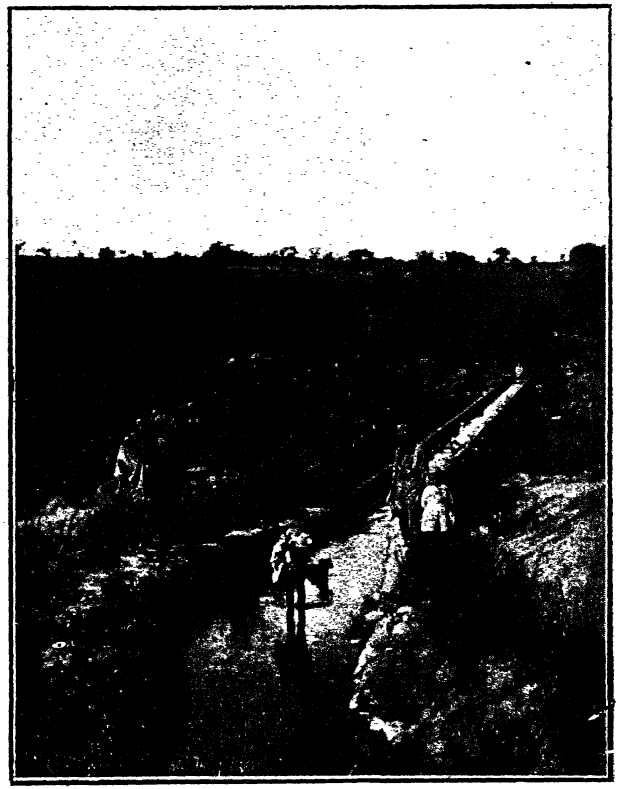
A similar project was first thought of by Mr. R. S. Fairbridge, Government Surveyor of Umtali, in the days of the early pioneers, with a view to the utilisation of the water of the Odzani River for the purpose of providing water to the Old Umtali township, and Mr. Fairbridge, who brought the matter before the writer, must in every sense be considered the father of the scheme.

The works, consisting of a permanent weir and head works, and a furrow approximately 20 miles long, capable of irrigating 3,000 acres, were constructed under contract at a total cost of £3,200. It is probably, as far as the writer is aware, one of the cheapest irrigation schemes of its size in South Africa.

The land that comes under the furrow cannot be classed as first-class agricultural soil. It consists of a rather mechanically fine granite soil, enriched here and there by the detritus from innumerable diorite intrusions. It is, however, as has before been stated, considered eminently suitable for citrus culture and also for general crops; on the top of this, the fact that cheap water power is available on every farm which the furrow traverses makes the scheme a particularly desirable one. The present participants in the scheme are:—Messrs. R. S. Fairbridge, farm "Kingsley"; H. H. O. Bridgeman, farm "Alderberry"; J. Lamport Stokes, farm "Kelly's Park"; British South Africa Company, farms "Wye" and "Reserve"; Colonel Oswald Baker's trustees, farms "Chiconga" and "Odzi Drift"; W. H. Deall, farm "Laverstock"; and probably G. L. Harrington, farm "The Grange."

The work was carried out by contract under the supervision of the writer and his assistant, Mr. C. L. Robertson. The original contract was taken up by Mr. Kenneth Hutton, who, it is with great regret I have to state, did not live to see the completion of his labours. After Mr. Hutton's demise, the contract was carried on by Mr. C. J. P. Waller.

The photographs here produced were handed to the writer by Mr. R. S. Fairbridge.



Odzani Furrow—No. 5. Shewing flume and typical country encountered.



Odzani Furrow—No. 6. Deep cutting on Mr. Fairbridge's farm.



Odzani Furrow—No 7.
Main furrow and temporary bridge.



Odzani Furrow—No. 8.
A "drop" on Mr. Fairbridge's farm.

Broom Corn.

Some years ago efforts were made to introduce broom corn as a regular crop in Rhodesia, and a small industry has since been carried on, which shews that the crop can without difficulty be produced on a commercial scale. The main drawback hitherto has been the lack of a market. Lately the manufacture of brooms has been established in South Africa on a considerable scale, and at least two factories are engaged in this industry in the vicinity of Capetown, drawing their supplies formerly from Austria and Hungary, and more recently from the United States of America, although difficulties have been experienced in obtaining adequate supplies from this latter source. Enquiries have been addressed to the Department of Agriculture as to the prospects of obtaining from Southern Rhodesia the requisite material for the manufacture of brushes, and as the result of correspondence the information has been elicited that a market can be assured for at least 150 tons, and probably double that quantity, whilst there is every reason to expect that even four times this amount could be successfully disposed of, if the quality and prices are right. Manufacturers have been advised that at present it is impossible to supply their needs, but that, if sufficient inducement is offered, it is possible that a considerable quantity might be grown during next season.

The railways of Rhodesia and the Union have been approached on the subject, and have quite recently agreed to grant special rates for this commodity. The Beira & Mashonaland & Rhodesia Railways have intimated that for truck loads of at least four-ninths of the marked carrying capacity of the truck special rates will be granted, the precise amounts being still under consideration.

Prices are subject to considerable fluctuation at the present time, but definite quotations have been received per long ton of 2,240 lbs. free on rail Capetown as follows:—

First grade	£25 per ton.
Second grade	£23 per ton.
Third grade	£20 per ton.

This may be taken as approximately the prices obtainable.

Samples have been received from the manufacturers, and are reserved in the Department of Agriculture, where they may be inspected by anyone interested. The broom corn would be shipped in bales, and buyers emphasise the importance of it being thoroughly dry before being packed. The brush is, of course, free from seed, and should not be dead ripe, as a greenish tinge is valued.

Although in the past it was not possible to find a market for this article, it is now possible that we may be able to take advantage of war conditions to establish a demand for Rhodesian broom corn to the exclusion of the article imported from oversea in years to come.

An article on the cultivation and preparation of broom corn appeared in this *Journal* for December, 1909

Nature Notes.

IV. PLANT COLLECTING.

By F. Eyles, F.L.S.

Most people take an interest, however slight, in showy flowers and ornamental plants. The well stocked greenhouse, or carefully tended garden, will always give pleasure and evoke admiration. This being so, it is somewhat remarkable that few people pay attention to our wonderful native plants. When a striking show of colour is seen on the veld, we hear the exclamation, "How pretty," and there the matter ends; or it may be that a bunch of flowers is picked, to wither, perhaps, before the home is reached. It is quite fashionable to grow varieties of the common ferns on the verandah, and an occasional lily or other bulb is transplanted to the garden, but this is about the limit of public interest taken in our very fine Rhodesian flora. The botanical, as distinct from the horticultural, side of the subject is even more neglected. A limited number of specimens of Rhodesian plants is preserved in museums in England and the Union of South Africa, but these were mostly gathered by collectors no longer resident here, and very little systematic work is now going on.

This state of affairs is the result, I feel sure, of lack of information, of the existence of a wrong impression as to the difficulty of the subject, and of a failure to appreciate its importance. I hope I may be able to say something that will awaken interest in and induce some readers of the *Journal* to take up the study of Rhodesian plants.

I do not propose to deal with the horticultural aspect of the question, though I must remark that we possess many very handsome native flowering shrubs (in addition to the popular Zimbabwe creeper) quite equal to imported ones, that our

veld carries a host of lilies, amaryllids, gladioli, orchids, kæmpferias, etc., etc., that would make a grand show if massed by colours in the garden, while the variety of aloes, crassulas, stapelias and other wild fleshy plants would, if brought together, make a unique and attractive rock-garden. The last would also be of great scientific value if the gardener planted every possible kind of succulent plant he could get in the country, because this class of vegetation can only be studied satisfactorily in the living state, as it is very difficult to make good dried specimens of them.

For the future of Rhodesian botany, my hope rests on the young generation, and so the more elderly learned readers of this paper must forgive me if I deliberately make my language as simple as I can for the benefit of the boys and girls. I will not greatly enlarge on the importance of the study of plants in a new country. Let me mention a few of the valuable things we may possibly find, and probably shall find, if we thoroughly ransack the veld of this country. There are foods for men, new forages for our cattle, new medicines, gums, rubbers, resins, dyes, fibres for paper and ropes, timber, oils, tanning materials and other things too many to mention. All these come from the vegetable kingdom, and are very valuable, but we cannot use them or profit from them unless we know where to find them. It is almost certain that some of all these things lie hidden in our Rhodesian plants, and will remain undiscovered till we look for them. It will pay to collect plants.

First let me say that it is quite a wrong idea to fancy that no one can make a useful and even scientifically valuable collection of plants unless he is a trained botanist. It is not everyone who has time or inclination to make a deep study of any subject, but the collection of plants is scarcely more difficult than the collection of postage stamps, and much more useful. A child can learn to do it well, as I have seen by some of the school collections that have from time to time been submitted to me. I will explain in as few words as possible how easy it is to make a collection of local plants, with very little cost or trouble, in such a way as to become of enticing interest to the collector, and at the same time be a real and permanent addition to the scientific knowledge of the country.

Do not put off collecting till you are an expert botanist, or you will never collect at all, nor will you ever be a botanist. Start with a firm conviction of your ignorance, and an equally firm ambition to learn. You see flowers around, but you do not know their names, for unfortunately few of our wild flowers have popular names like the buttercup and daisy. Begin by gathering the very commonest that you walk over every day. If they are small plants, try to get them perfect with roots, leaves and flowers. Take at least three of each kind, one to examine with the botany book and find out roughly where it belongs, and two to be pressed and dried, the one to keep for your own collection, and the other to be sent away for naming. The apparatus for collecting in the field is very simple. I use two very thin, light 3-ply boards, between which I place three to six "Daily Graphics," the whole being held together by a pair of strong rug-straps with handle. Specimens as gathered are put between the pages of the periodicals, gradually filling them from bottom to top, and tightly strapped together. In this way the collection of a day or two days can be carried home without injury or wilting. Wire-work frames, 18½ inches by 11 inches, specially made, can be obtained instead of the boards, and ordinary newspapers cut to the size will do quite well instead of "Daily Graphics."

When you get home, the specimens you wish to dry and preserve should be carefully spread out on old newspaper or blotting paper. Lay them as naturally as you can, to display their shape, with as few parts as possible overlapping. No two specimens should touch one another, and two kinds of plants must never be put on the same sheet. The plants between their sheets of paper must be put under pressure. A stiff board to cover the sheets and a heavy weight on top is best. Begin in a simple way by using common newspaper, or blotting paper and newspaper. Specimens should not be more than 16 inches by 10 inches in size. A number of different specimens may be made into a pile, and all pressed under one weight, provided care is taken to get them spread out as evenly as possible with regard to thickness. For instance, if the first sheet has a big root lying at the top left-hand corner, see to it that the thick part on the next sheet is not on top of it; put it (say) at the bottom right-hand corner, and the next similar part in another place. The second day the specimens

should be put between dry sheets, and the damp paper hung up to dry in the sun or by the fire. During our winter the plants may be changed into fresh driers every second or third day for about a fortnight, when they should be finished and ready for mounting. When properly dry, they are stiff and brittle, and do not give a cold feeling if the back of the hand is pressed against them.

Some soft watery plants like aloes require special treatment, but I will not deal with them here, for I recommend the beginner to collect at first only the plants that are easy to preserve. He can advance to more difficult material later. A small note book should be bought, and the first page devoted to the first plant collected; nothing else should go on that page. At the top left-hand corner write "No. 1," and leave the line blank for a name to be filled in later. A couple of lines below write in date of collection, followed by place where taken, and then a few particulars of the plant, especially such things as will not be shewn on the dried specimen—for example, the colour of the flower, and if a shrub or tree, its size and style of growth; also the height above the sea, if you know it, and say if the plant grows on open veld, rocky hillside or by the water. Near the foot of the page make a note of what you did with the duplicate—(say) "1st August, 1917, sent to Agricultural Department, Salisbury." The note book should be entered up when the specimens are first put in the press, and a small slip of paper should be put in each sheet bearing the same number the specimen has in the note book.

The duplicates for naming can be sent off as soon as dry without further attention. Pack them between dry sheets of newspaper, with only one kind on each sheet, and a number slip with each. Place stiff cardboard above and below the parcel, wrap in brown paper, and tie tightly with string. In this way the specimens will travel safely by train or post, but the stamps should be on a free label to prevent damage in post office. As many as 100 plants can be sent this way if desired. The parcel of duplicates must now be forwarded to some botanist for naming, say to the Agricultural Department, Salisbury, or to the writer, or, if preferred, to Kew Gardens or the British Museum. Some patience will be required to wait for a complete list of names, for specimens sent to London

often remain for a long time before they are completely identified, though an advance list of names as near as ascertainable can generally be procured. On the other hand, no one in Rhodesia knows the names of half our plants as yet, so if the duplicates are sent to me or to the Government Botanist, names could be given at once for plants that are known, and the remainder would be sent to London for final identification.

The duplicates having been sent off for naming, the remaining specimen must be prepared for mounting and preservation. To prevent the attacks of insects, it must be poisoned with a solution of corrosive sublimate in alcohol, which the chemist will put up, the strength being ½ ounce poison to 1 quart spirits of wine. The specimen may either be immersed in a shallow dish of the solution, or placed on glass and brushed on both sides with a soft camel hair brush dipped in the solution. It should then be placed again between dry paper, and left under light pressure for a day or two. It is then ready for mounting on paper, which should be of good quality, and fairly stiff; the specimen to be securely fixed in place with two or more narrow slips of gummed paper. The sheets for mounting must all be one size, no matter how small the specimen; the standard size is 16½ inches by 10½ inches. The herbarium number, the name of the plant and a few other details, such as date of collecting, are written on the bottom right-hand corner of the mounting sheet, or a label may be pasted on for same purpose. It is convenient to have the drying papers of the same size as the mounts, and then the plants when first put in the drying press, if necessary, can be doubled up to fit the paper.

All this may sound rather tedious and complicated, but after being done once, becomes quite easy, and does not take much time. My own system is to have a sheet of blotting paper, twice the size of my mounting paper, folded so as to be double. A specimen and number slip are placed in this, and the whole put into a "Daily Graphic." Two sheets or more as needed of the "Daily Graphic" are left between each folded blotter and the one above it, and the blotters slipped into the "Daily Graphic" until the latter is full, when it is laid on the floor or on a table with a heavy weight on top. A 5-gallon paraffin tin of earth, full or partly filled, makes a

good weight. By this system the specimens are never handled after first being put in the press until they are ready to poison and mount, the blotters complete with contents being slipped in and out as required. It must be remembered that, whilst at first one may go through the complete process as an experiment with only one or two specimens, later one becomes expert, and 100 specimens can be changed from wet to dry paper in much less than an hour. It would only take five minutes to shew how all this is done, though it has taken so long to explain it in writing.

The storing of sheets of mounted plants must depend upon the means at the disposal of the collector. A beginning may be made with a box large enough to allow the sheets to lie flat one on the other, but as the collection grows, a cupboard will be found convenient. All the species of one genus are kept together in a large cartridge paper jacket, with the name of the genus written outside. For instance, all the different kinds of hibiscus would be in one jacket, and the jacket will have its own place in the cupboard, which should be made with shelves one above the other, a few inches apart, and each shelf somewhat larger than a genus jacket every way so as to allow the sheets to slide easily in and out without friction. It is usual to arrange the plants in the cupboard in botanical order, according to whatever text book the collector decides to follow. The cupboard should have well fitting doors to keep out dust and insects. A standard cupboard is 4 feet high, 2 feet wide and 18 inches deep. One vertical partition and seven horizontal shelves divide the interior into 16 compartments. The partition and the central shelf should be of $\frac{1}{2}$ inch deal for strength, but the other shelves should be only $\frac{1}{6}$ inch thick to economise space.

I should like to make it clear that plant collecting is not recommended as a mere hobby to rank with games or stamp collecting. It is a recreation in the highest sense, and one that will increase in interest as the student grows older and his or her knowledge expands. It will give pleasant occupation in spare hours, especially during the evenings at the farm house, and even in town, when there is no dance and the bioscope has become a weariness. The plant collector will never find his country walks dull, for, unlike the sportsman,

he always has "good hunting," and generally brings back something new. Even at the dead end of our dry season it is astonishing what a variety of shrubs and plants will be found in flower when the habit of looking for them has once been acquired. For instance, I spent a fortnight on Forest Hill Farm, Makoni, in June and July. My friends warned me I should find little of botanical interest, as the veld was all dried up, yet I brought back with me considerably over one hundred kinds of plants that I had never seen before, although I have been collecting off and on in Rhodesia for years past. My dry season takings on this occasion, all within a four mile radius, ranged from the humblest lichen clothing a rock to the flowers of majestic forest trees, and included some very handsome ornamental shrubs and items of economical value. This will shew that our Rhodesian veld will at all times of the year yield material of interest to the plant collector. Although the wet season is naturally the time to find flowers and ferns, yet there is no single month of the year without plants peculiar to it which flower or fruit at that time by choice.

I would, therefore, here emphasise the point that the exploration of the vegetable resources of Rhodesia cannot be carried out with any hope of completeness by the travelling botanist. He visits a district, or a small part of it, one week in a year, and may not return to it for months, if ever. Yet, if the plants of that district are to become known, they must be studied and collected every month for years on end. This can only be done by local residents—people on the spot. Therefore, every farmer, or official, or teacher, or boy or girl who will take up plant collecting systematically, sending duplicates for naming to any selected botanist, is doing a work of national importance. To my knowledge more than one Rhodesian school boy has already had the pleasure of having a new plant named after him, and no one will work for long in any district without his patience being rewarded in the same way. When we have several collectors in every district, then, and not till then, can we hope to begin to get a real knowledge of Rhodesian wild plants.

The Agricultural Outlook.

Reports from the country as a whole indicate that grazing is very fair for the time of year, that in parts where the grass is dried up an early recovery is expected owing to the amount of moisture in the soil being greater than in recent years. Therefore the prospects of stock for the remainder of the winter are good.

In respect to the prospects of the maize crop, nothing new is reported, except that in certain districts the grain is not harvesting quite up to expectations. This is largely due to the ravages of the top grub, the depredations of which are never fully realisable until actual harvest takes place. At the same time the largest crop yet recorded may be anticipated.

The mildness of the winter has had a good effect on most winter crops, which may be expected to be unusually good.

Veterinary Report.

May, 1917.

AFRICAN COAST FEVER.

SALISBURY DISTRICT.—On the 8th May a fresh outbreak was discovered on the farm Waterfall. Four head were found dead and seven were destroyed. On the 31st May a beast died on the adjoining farm Hopley. *Post-mortem* and microscopic examinations shewed Coast Fever. The herds involved are being temperatured regularly and dipped every five days.

MELSETTER DISTRICT.—No fresh outbreaks. On the infected farm Helvetia one beast died. *Post-mortem* examination was suspicious of Coast Fever; unfortunately the microscopic preparations forwarded were unsuitable for examination.

MAZOE, MREWA AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the existing centres of infection.

VICTORIA DISTRICT.—A fresh outbreak occurred on the farm Lounton. Twenty-seven head died, and, as infection was so intense, the remainder, consisting of 75 head, 26 of which were visibly sick, were destroyed; also three head of healthy native cattle which were grazing very near the infected veld. The source of the infection in this case is inexplicable. The district had been free from Coast Fever for ten years, and there is no known centre of infection within at least 120 miles.

BLACK QUARTER.

Two hundred and thirteen deaths reported from the Bula-

lima-Mangwe, Matobo, Bulawayo, Umzingwane and Bubi districts.

MALLEIN TEST.

The following animals from the Union (some of which were in transit to Northern Rhodesia) were tested, with negative results:—Horses, 61; mules, 41; donkeys, 22.

EXPORTATIONS.

Slaughter oxen *via* Bulawayo, 333; *via* Liebig's Drift, 207.

IMPORTATIONS.

Bulls, 48; heifers, 259; horses, 56; mules, 6; sheep and goats, 1,517.

June, 1917.

AFRICAN COAST FEVER.

Salisbury District.—No fresh outbreaks. At the infected farm Hopley six head were destroyed.

Umtali District.—A fresh outbreak was discovered on the farm Engwa, in the southern section of the district. Infection is intense, and there is no doubt has existed for a considerable period. Eighty-six head died or were destroyed, leaving 53, which are being temperatured and dipped regularly.

Victoria District.—Fresh outbreaks occurred on the farms Glenlivet, Midwaters and Erichsthal, immediately ad-

joining the farm Lounton, on which the disease was first discovered. The infected herds are temperatured regularly, and all suspicious cases are destroyed, and, pending the completion of dipping tanks, are sprayed.

MAZOE, MELSETTER AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the infected centres.

MREWA.—No fresh outbreaks. Two beasts destroyed on infected farm Exeter, one of which shewed Coast Fever by microscopic examination.

ANTHRAX.

One case of anthrax occurred on the farm Passaford and one on the Pearson Settlement in the Mazoe district. Arrangements are being made for the vaccination of the herds on these farms.

BLACK QUARTER.

Two hundred deaths reported from the Bulalima-Mangwe, Matobo, Bulawayo, Umzingwane, Insiza, Bubi and Nyamandhlovu districts.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 96; mules, 6; donkeys, 22.

TUBERCULIN TEST.

The following animals imported from the United Kingdom were tested, with negative results:—Bulls, 32; heifers, 41.

IMPORTATIONS.

Bulls, 53 (34 *ex* United Kingdom); heifers, 101 (46 *ex* United Kingdom); horses, 95; mules, 3; donkeys, 93; sheep and goats, 1,034 (including certain animals omitted from May report).

EXPORTATIONS.

Slaughter oxen *via* Bulawayo, 935; *via* Liebig's Drift, 56; pigs, 46; sheep and goats (including May), *via* Liebig's Drift, 417; horses, 4; mules, 4; donkeys, 102.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

August.

BEE KEEPING.

Now that warmer weather prevails, hives can be opened with safety and examined. Do this when the sun is shining and without exposing the bees too long. The queens are now laying, and, should there be a scarcity of food, feed the bees with syrup inside the hive. Where a hive carries a fair supply of honey, queens can also be encouraged to produce eggs by crushing with a knife blade the cappings of sealed honey still remaining in brood combs. This month and next bees will be collecting nectar and pollen from fruit and bush bloom. Where strong south-easterly winds prevail, hive entrances should be shielded. This will afford bees great assistance in their going out and coming in.

CITRUS FRUITS.

Orange trees should already have been pruned, and are now ready for the first irrigation. The first growth should be commencing early in the month, and by this time the trees should already have had one good soaking. As soon as the trees have set their fruit they should never be allowed to stop growing through lack of moisture, otherwise the fruit is liable to be poor in quantity and lacking in quality. After irrigation, cultivation should follow, and the earth round the trees be loosened with a spade. If fertiliser is to be used, it should be applied after the first irrigation, so as to be thoroughly incorporated with the soil in the cultivation following.

CROPS.

Provided there are no heavy frosts, dhal may be allowed to remain until August before harvesting. As a second or third year crop, dhal can always be cut earlier, say towards the end of June or in July. Castor beans should be harvested as the pods ripen, which they continue to do for a considerable period. Ploughing should be undertaken continuously wherever possible; the value of early ploughing cannot be over-estimated. Ploughing should be followed as soon as possible by harrowing. Mangels can be pulled and fed as required. The ensilage pit can now be opened, and the contents fed. Seed potatoes should be worked over, and decayed tubers removed.

Crops under irrigation will require but little attention. In oat crops, where the seed has been obtained from the Union, care should be taken to weed out any Drabak or Darnel (*Lolium temulentum*) that may be growing among the crop, as this weed is poisonous. Care should also be taken not to over-irrigate any of the lands.

ENTOMOLOGICAL.

Potato.—Early planted crops of potatoes may be attacked by caterpillars. The crops should be sprayed immediately with an arsenical wash.

Cabbage Family.—Young plants of this family should be kept sprayed with an arsenical wash to check attack by webworm. Do not spray plants of which the foliage is eaten within three weeks of use.

Onion.—May still be troubled with thrip. Use tobacco wash or paraffin emulsion.

Deciduous Fruits.—Any trees infested with scale may be sprayed with a winter wash during August. Lime sulphur salt wash or scaleside is recommended.

Guava.—Collect and destroy remnants of late crops to keep down citrus codling, especially if trees are in vicinity of citrus orchards.

FLOWER GARDEN.

This is a busy month, and the soil should be kept in good tilth. Roses, shrubs and ornamental trees may be planted. All seeds may now be sown. Marguerite carnations sown now will flower by the end of the year. Cuttings of carnations and other perennials should be planted either in the open ground or in boxes, using loose and well-decomposed soil for the latter, taking care that they are well drained, or the success will be small.

FORESTRY.

Cuttings of ornamental shrubs, roses, etc., struck in sand last month should be transplanted into good soil as soon as they shew a good healthy growth of leaves. A large percentage of cuttings will damp off if left in sand longer than about six weeks. No manure should be added to the potting soil. Seed beds should be prepared and all conifer seeds sown. Gum seeds may also be sown if required for planting early in the season. If the trees are to be grown in seed beds only and not in tins, then gum seeds should not be sown until October, or later, as they will get too large.

GENERAL.

Fireguards should be completed and every precaution taken to guard against loss of grazing from fires. Natives commence ploughing their softer land this month, and for this reason, as well as because beer is plentiful at the kraals, local labour is apt to be scarce. At this time of the year, however, the need for boys on farms is not so severely felt as later on.

POULTRY.

Keep the young stock growing, and give plenty of ventilation to their sleeping quarters as the nights grow warmer. A good supply of green food and a small quantity of powdered charcoal in the soft food will keep them healthy. Do not hatch more chicks than you can safely house and attend to when they mature.

STOCK.

Cattle.—On the early granite and sand veld probably the worst of winter is over so far as grazing is concerned, and a nice bite of green grass is appearing. Care should be taken where cattle are allowed to graze on the early burnt grass not to let them get too much at first. On diorite farms the haystack will still be required, and in all cases a certain amount of hay or ensilage should be held in reserve against the possibility of very late rains. The bulls may again be put back into the herds. Any very young calves should be kept near home, and dipping should be carefully attended to. In dairy herds on any soil whatever, feeding, housing and bedding cannot be relaxed. Cows in full milk will benefit by a ration of, say, 5 lbs. of maize (crushed and soaked), 30 lbs. to 40 lbs. of ensilage or pumpkin and 8 or 10 lbs. of hay. If it is possible to give, in addition to the above daily ration, 2 lbs. of peanuts, crushed with the shell, or linseed ground with maize, or peanut cake, a very great benefit will be derived. Calves, especially young ones, must be carefully watched; they should not run too far, and are better inside, except when the weather is warm. A little sweet hay, bean meal, linseed, peanuts or peanut cake and a small ration of green food will pay to feed to them.

Sheep.—Sheep should give little trouble at this time of the year, but on very dry veld a handful of mealies and a little hay or ensilage will materially assist ewes with young lambs.

VEGETABLE GARDEN.

All vegetable seeds may now be planted. Those having but a limited supply of water would be wise to sow in boxes, transplanting when large enough. The seed beds require careful preparation; they should be well raked up and laid out in long narrow rows in order to facilitate watering. The tops of the beds should be levelled as near as possible, and when sown, covered over with a thin layer of straw or grass, which will prevent the seeds being washed out when watering and the soil from caking.

VETERINARY.

Redwater and gallsickness occur all the year round, although these diseases are more prevalent during the summer months. A good many deaths occur this month, however, amongst imported stock. Vegetable poisoning will probably be in evidence. Sheep can be inoculated against blue tongue. Scab is a poverty winter disease.

WEATHER.

No rain is to be expected, and even on our eastern mountains the precipitation is trifling. Showers, however, do occasionally fall in places, but are of no consequence. The sun is often warm during the day, but the nights are apt to be cold, and grazing being scarce, food and shelter are necessary for the stock.

September.

BEE KEEPING.

In sheltered localities many trees in the bush will now be in bloom. Should there be indications of swarming, put on a crate of sections or shallow frames, correctly fitted with super-foundation. Where a swarm has been secured, place it in a modern hive, and from an established stock remove a frame of comb containing unsealed brood and honey, shake off the adhering bees on to their own alighting board, then insert this comb into the centre of the newly hived swarm. This plan compels the bees to start work at once. As a means of preventing the escape of the queen, a narrow strip of excluder zinc may be fastened at the entrance. This should be removed after about two weeks.

CITRUS FRUITS.

If the trees were irrigated early in August, the next application of water should be given about the first or second week of this month. After irrigation, cultivation should follow. Constant attention should be given to young trees, and a watch kept for any adventitious shoots or suckers, which should be cut away at once. This should be attended to right through the growing season.

CROPS.—See August.

ENTOMOLOGICAL.

Tobacco.—Young plants in seed beds may suffer from cutworms. See Handbook of Tobacco Culture, published by Agricultural Department, pp. 71-90.

Potato.—Early potatoes are liable to suffer from caterpillars. The crop should be sprayed at first sign of injury with an arsenical wash.

Cabbage.—During this month the most prominent enemies of plants of this family are diamond back moth and webworm. Cabbage louse is sometimes troublesome. The young plants may be sprayed or dusted with an arsenical compound for the former, and sprayed with tobacco wash and soap for the latter.

Beans planted under irrigation during September usually escape serious infestation with stem maggot.

Citrus Trees.—Scale insects commence to increase rapidly with the advent of warmer weather, but the trees should not be sprayed or fumigated while in blossom.

FLOWER GARDEN.

Although our spring advances with this month, rains are very uncertain and usually scarce, but in spite of circumstances plants now grow with very little encouragement. Perennials and shrubs should be well attended to, especially those which flower early; the soil should be kept well stirred around the stems, and they should be watered if necessary.

Practically all flower seeds may now be sown in boxes, nursery beds, or in the open ground where they are to be grown. Nursery beds are perhaps preferable, as a great deal of watering may have to be resorted to on account of late rains. All annuals sown in July should now be ready for transplanting; should these be few, and a larger show of flowers desired, the heads may be pinched out after planting, which makes the plant spread out more and become bushy. Shrub and ornamental tree seeds should be sown now if desired for planting out during the rainy season, and may be sown in the open; if it is desired to hasten them they should be planted in boxes and covered with glass, and placed in a sunny position sheltered from the winds. If summer bulbs have not already been re-planted, this should be done at once; they sprout as the weather becomes warmer, and, if allowed to do this before planting, the bulb loses much of its vigour. It must be borne in mind that all bulbs that cluster, if divided, produce better blooms, and the plants have a better appearance than the old cluster, which has a lot of decayed matter and generally a ragged appearance; this also applies to those perennials which may be increased by division of roots.

FORESTRY.

All cuttings struck in sand in July and not yet transplanted into good soil should have this done as soon as possible. All gum seeds should be planted now if it is intended to grow the transplants in tins. If they are to be grown in beds only, don't plant gum seeds until next month. The seed beds may with advantage be prepared now and watered to make the weed seeds germinate, so that they may be destroyed before planting next month.

GENERAL.

Indigenous labour is apt to become more scarce at this time of the year, the boys returning to their kraals to break up the land for next season. Stock are liable to stray in search of the young grass now coming up, and much trouble from this cause is to be looked for on unfenced farms. Natives are now cultivating their gardens preparatory to sowing their crops, which they do much earlier than do Europeans. The mischief caused by veld burning becomes apparent from this time onwards in the condition of the stock, and it is necessary frequently to move them away in search of grazing.

POULTRY.

Thoroughly overhaul all the houses before the rains. Do not wait for the first shower to indicate where the leaks are. Early hatched cockerels should be separated from the pullets by now.

STOCK.

Cattle.—Ranching cattle should require little now in a normal season; it is only in the event of very late rains that trouble should be expected. Where possible, it will be wise to keep an eye on those cows that may be expected to calve early, with a view to feeding them if necessary, and seeing that they do not get too poor. The dairyman will carry on much as in August; he will, however, use his discretion (in accordance with the condition of his veld) as to the use of ensilage, pumpkins or other bulky and succulent food. He will be wise not to shorten the supply of concentrated foods for some time to come. A little hay or ensilage should still be kept in reserve until the rains have fallen in reasonable abundance.

Sheep.—The remarks for August apply. If spring lambs are expected, it will be wise to see that the sheep shed is in good order—clean, dry, properly drained and airy. Watch that the ewes shall not be poor when they lamb, and remember that they cannot rear good lambs if the veld is bad, but must have their grazing supplemented, just as milk cows are fed in order to produce milk.

TOBACCO.

Begin sowing seed beds each week for the acreage proposed to be planted; fertilise and push them so as to be ready for planting out should rain come early in November.

VEGETABLE GARDEN.

Most seeds may now be sown, though there is risk of losses from want of rain. Watering, of course, can be resorted to. Marrows, pumpkin, melon, cucumber and peas may be planted in the field after the first rains. Tomatoes that have been sown earlier should be planted out, and these as they come on should be staked.

VETERINARY.

There should be very few deaths from redwater and gallsickness this month. Cases of vegetable poisoning of stock picking up tempting young green shoots of dangerous character on the burnt veld are of frequent occurrence. Sheep can be inoculated against blue tongue, but ewes in lamb should not be treated, on account of the danger of abortion. Scab may be prevalent.

WEATHER.

The temperature may be expected to rise steadily during this month. Rains are not due until next month, though the average over a period of years shews slightly more than in the previous four months, and ranges between .1 and .5 inch. Frost has been known to occur in September, although this is a very unusual event. Rain-gauges should be seen to before the rains commence. They should be carefully adjusted to stand exactly level with the lip four feet above ground, and care should be taken that no tree, building or other obstruction interferes with the fair precipitation of rain into the orifice.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1917	May	6·12	0·29	0·11	0·19
1917	June	6·15	0·27	0·16	0·21

TEMPERATURES.

Station	May		June	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MASHONALAND—				
Charter—				
Enkeldoorn	76·7	46·5	78·0	40·2
Hartley—				
Gatooma	83·6	53·9	—	—
Hallingbury Farm	80·3	51·0	77·4	40·2
Hartley Hospital	83·9	51·2	80·7	42·2
Idaho Farm	—	—	—	—
Lomagundi—				
Eldorado Mine	79·9	49·9	—	—
Sinoia	54·8	65·2	82·0	56·5
Sipolilo	—	—	—	—
Mangwendi—				
Kwenda Hospital	72·9	58·5	57·3	45·7
Mazoe—				
Shamva Mine	79·3	52·9	—	—
Melsetter—				
Melsetter	69·9	45·8	68·2	44·2
Mount Selinda	70·9	50·9	—	—
Vermont	74·6	55·4	73·3	46·2
Salisbury—				
Chishawasha	77·3	50·1	75·9	43·3
Salisbury (Gaol)	77·2	49·4	—	—
Umtali—				
Public School	—	—	—	—
Summerfield	—	—	—	—
Victoria—				
Eythorne	74·5	49·8	66·1	38·7
Morgenster	—	—	—	—
Victoria	75·8	49·8	—	—

TEMPERATURES—*(Continued).*

Station	May		June	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	79·6	50·9	—	—
Garth	80·2	48·8	46·5	38·2
Plumtree School	—	—	—	—
The Retreat	82·8	52·2	82·0	45·4
Bulawayo—				
Observatory	73·1	52·3	—	—
Gwanda—				
Antelope Mine	77·8	55·0	76·8	50·0
Mazunga	82·0	54·9	—	—
Tuli	82·5	54·5	79·3	43·6
Gwelo—				
Gwelo (Gaol)	76·9	39·6	74·6	37·0
Matobo—				
Holly's Hope	79·6	50·9	77·8	41·6
Rhodes Matopo Park ...	76·6	51·1	74·0	41·3
Umzingwane—				
Essexvale	77·7	49·0	79·0	38·6
Hope Fountain	—	—	—	—
Wankie—				
Victoria Falls	83·0	34·5	46·5	22·0
Wankie (Hospital)	87·6	60·2	85·6	51·2

RAINFALL.

Station	May	June
MASHONALAND—		
Charter—		
Buhera	0·33	—
Bushy Park	—	—
Enkeldoorn Gaol	0·80	0·04
Marshbrook	0·20	Nil
Range	0·24	0·05
Riversdale	0·82	—
Umniati	Nil	Nil
Vrede	0·07	—
Chibi—		
Chibi	0·18	—
Nuanetsi Ranche	0·36	0·44
Wylde Grove	0·27	0·02
Chilimanzi—		
Central Estates	0·46	Nil
Chilimanzi	0·86	0·04
Driefontein	0·33	Nil
Induna Farm	0·54	—

RAINFALL—*(Continued).*

STATION	May	June
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	—	—
Umvuma (Railway)	0·49	Nil
Darwin—		
Mount Darwin	—	—
Gutu—		
Chingombe	0·86	—
Eagle's Nest Ranche	0·36	—
Gokomere	0·25	—
Gutu	0·28	—
Hartley—		
Ardgowan	0·25	—
Auchter Leny	—	—
Battlefields (Railway)	0·41	—
Carnock Farm	0·96	—
Elephant Hill, Battlefields	—	—
Elvington	0·83	—
Gadzema (Railway)	1·89	—
Garthnor	1·14	—
Gatooma	1·70	—
Gatooma (Railway)	1·68	—
Gowerlands	1·62	—
Hallingbury Farm	1·34	—
Hartley (Railway)	0·54	—
Hartley Hospital	0·68	0·01
Hopewell	—	—
Idaho Farm	—	—
"Jenkinstown"	1·08	—
Makwiro (Railway)	1·46	—
Philiphaugh	1·55	—
Shagari	1·67	—
Spitzkop	—	—
Inyanga—		
Inyanga	—	—
St. Trias' Hill	0·56	—
Lomagundi—		
Argyle	0·85	—
Banket Junction (Railway)	0·59	—
Darwendale	0·16	—
Duxbury Farm	0·12	—
Eldorado Mine	1·68	—
Eldorado (Railway)	1·53	—
Lion's Den	0·25	—
Lone Cow Estate	0·77	—
Longmead	0·02	—
Maningwa	1·18	—
Palm Tree Farm	—	—
Sinoia	0·43	—
Sinoia (Railway)	0·40	—
Sipolilo	—	—
Umvukwe Ranche	—	—

RAINFALL—(*Continued*).

Station	May	June
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	0·15	—
Chimbi Source	0·58	—
Delta	1·26	—
Eagle's Nest	0·72	—
Ellavale	—	—
Gorubi Springs	0·33	—
Headlands (Railway)	0·86	Nil
Mona	Nil	—
Monte Cassino Mission	0·34	Nil
Odzi (Railway)	0·99	,,
Rusape (Railway)	Nil	,,
Springs	0·32	—
York Farm	—	Nil
Marandellas—		
Bonongwe...	1·24	0·04
Huish Estate	0·89	0·03
Kwenda Hospital	0·60	Nil
Land Settlement Farm	0·63	—
Macheke (Railway)	1·68	Nil
Marandellas	2·60	—
Marandellas (Railway)	2·27	Nil
Nelson	0 14	—
Selous Nek	0·38	Nil
Theydon	1·29	,,
Tweedjan	0·37	,,
Verdoy	—	—
Mazoe—		
Avonduur	—	—
Bindura	0·80	3·94
Bindura (Railway)	0·55	Nil
Ceres	0·06	—
Chipoli	0·42	—
Citrus Estate	0·08	—
Dunmaglas	—	—
Jumbo (Railway)	0·25	Nil
Kilmer	0·23	—
Kingston	0·30	Nil
Laguaha	—	—
Lowdale	—	—
Mazoe	0·16	Nil
Mguta Valley	—	—
Omeath	0·40	Nil
Protea Farm	—	—
Ruia	—	—
Ruoko Ranche	Nil	Nil
Shamva	—	—
,, Mine	0·11	—
Stanley Kop	Nil	Nil
Sunnyside	—	—
Teign	Nil	Nil
Virginia	—	—
Volynia Ranche	—	—

RAINFALL *(Continued).*

Station	May	June
Mashonaland—(Continued)		
Mrewa—		
Glen Somerset	0·39	—
Mrewa	Nil	—
Mtoko—		
Makaha	0·01	Nil
Mtoko	0·03	,,
Melsetter—		
Brackenburg	0·29	0·40
Chikore	0·62	0·11
Chipinga	0·54	—
Helvetia	1·77	—
Melsetter	0·92	0·11
Mount Selinda	1·88	—
Mutambara Mission	0·11	Nil
Pasture	0·15	,,
Tom's Hope	0·92	0·04
Vermont	2·24	0·28
Ndanga—		
Bikita	1·18	0·11
Chiredzi Ranche	0·35	—
Marah Ranche	—	—
Ndanga	0·52	0·10
Pamushana	1·23	—
Salisbury—		
Ardbennie	—	—
Avondale	—	—
Botanical Experiment Station	0·71	—
Bromley	2·73	Nil
Brookmead	—	—
Borrowdale (Hatcliffe)	0·46	—
Chishawasha	0·18	Nil
Cleveland Reservoir	0·48	,,
Ewanrigg	—	—
Forest Nursery	—	Nil
Goromonzi	0·65	,,
Gwebi	0·45	,,
Glenara	—	—
Hillside	0·14	Nil
Lilfordia	—	—
Salisbury (Gaol)	0·41	—
,, (Railway)	—	Nil
Sebastopol	0·42	,,
Selby	0·23	—
Stapleford	—	—
Sunnyside	—	—
The Meadows	0·56	0·03
Vamona	0·12	Nil
Westridge	0·76	—
Umtali—		
Odzani	0·54	0·08
Penhalonga	1·63	—
Premier Estate	Nil	1·02
Public School	—	—

RAINFALL *(Continued)*.

Station	May	June
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	0·14	—
Stralsrund	0·23	Nil
Summerfield	—	—
Umtali (Railway)	—	Nil
Utopia	—	—
Urungwe—		
Nassau Estate	0·07	Nil
Victoria—		
Brucehame	0·15	Nil
Clipsham	0·45	—
Empress Mine	—	—
Eythorne	0·23	0·02
Fairburn	0·34	0·02
Fort Victoria (Railway)	0·37	Nil
Marthadale	—	—
Makorsi River Ranche	0·64	Nil
Morgenster	—	—
Silver Oaks	0·34	Nil
Victoria	—	—
MATABELELAND :		
Belingwe—		
Tamba	1·40	—
Wedza	2·01	0·03
Bubi—		
Bembesi (Railway)	0·45	Nil
Imbesu Kraal	1·06	,,
Inyati	0·96	—
Maxim Hill	1·29	—
Shangani Estates	—	—
Bulalima-Mangwe—		
Empandeni	0·30	—
Garth	0·53	Nil
Mholi (late Magot)	0·45	—
Plumtree School	—	—
The Retreat	0·79	Nil
Riverbank Farm	0·82	,,
Solusi Mission	1·20	,,
Syringa	0·89	,,
Tegwani	—	—
Tjompanie	1·01	Nil
Bulawayo—		
Government House	1·54	—
Keendale	1·88	—
Khami	0·60	Nil
Lower Rangemore	1·19	—
Observatory	0·70	—
Raylton (Railway)	0·71	Nil
Umgusa	2·57	—
Umkien	—	—
Gwanda—		
Antelope Mine	0·57	Nil
Gwanda (Gaol)	0·23	,,

RAINFALL *(Continued)*

Station	May	June
MATABELELAND—(Continued)		
Gwanda—continued		
Gwanda (Railway)	0·22	Nil
Lamulas	0·17	0·44
Langalanga	0·10	0·13
Makalali	0·28	—
Manantji	0·22	Nil
Mapande	0·65	,,
Mazunga	0·07	,,
Mtshabzi Mission	0·37	,,
Tuli	0·38	0·05
West Nicholson (Railway)	0·35	Nil
Gwelo—		
Daisyfield	0·37	—
Dawn	0·40	Nil
Globe and Phœnix Mine	Nil	,,
Globe and Phœnix (Railway)	,,	,,
Gwelo (Gaol)	0·24	,,
Gwelo (Railway)	0·30	,,
Hunter's Road	0·32	—
Lalapanzi (Railway)	0·35	Nil
Lovers' Walk	0·35	—
Lower Gwelo	0·02	—
Oaklands	0·29	Nil
Rhodesdale Estate	Nil	,,
Sikombela Farm	0·80	,,
Troy	—	—
Woodendhove	0·17	Nil
Insiza—		
Albany	0·32	Nil
Filabusi	0·38	,,
Fort Rixon	0·32	—
Infiningwe	0·44	—
Insiza (Railway)	0·60	Nil
Inyezi Farm	—	—
Orangevale	—	—
Roodeheuvel	0·46	Nil
Shangani (Railway)	0·30	,,
Thornville	0·29	—
Matobo—		
Holly's Hope	0·19	Nil
Matopo Mission	0·61	0·10
Rhodes Matopo Park	0·33	Nil
Nyamandhlovu—		
Gwaai (Railway)	0·71	Nil
Edwaleni	1·61	—
Impondemi	—	—
Melinakanda Junction	—	—
Naseby Farm	0 89	Nil
Nyamandhlovu (Railway)	1·11	,,

RAINFALL *(Continued).*

Station	May	June
MATABELELAND—(Continued)		
Sebungwe—		
Gokwe	—	—
Inyoka	—	—
Selukwe—		
Hillingdon	1·52	Nil
Selukwe (Railway)	0·34	,,
Tokwe River Ranche...	1·47	0·08
Umzingwane—		
Balla Balla (Railway)	0·93	Nil
Crombie's	0·64	—
Essexvale	0·51	Nil
Heany Junction (Railway)	1·27	,,
Hope Fountain	—	—
Springs Farm	1·15	—
Wankie—		
Bombusi	—	—
Dett (Railway)	0·95	Nil
Malindi (Railway)	—	—
Victoria Falls	0·20	Nil
Victoria Falls (Railway)	1·31	,,
Wankie Hospital	0·27	,,
Wankie (Railway)	—	,,

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917		
			August	September	October
Beatrice Road	Various farmhouses	H. W. Harris	8	12	10
Bembesi	Queen's Mine Hotel	V. C. Andrews	3	7	5
Bindura	Bindura	C. J. Glen	11	8	13
Bromley	Bromley	A. A. Draper	2	6	4
Charter—Mgezi	Beatrice Mine	W. Krienke	29	26	31
Central	Umvuma	— James	25	29	27
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	10	14	12
Enterprise	Arcturus Hotel	J. G. M. Bernard	1	5	3
Felixburg	Felixburg	R. H. Brown	11	8	13
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	4	..	6
Gatooma	Gatooma	T. J. Golding	18	15	20
Gazaland	Chipinga	W. Wood	25	29	27
Greystone	Roodeheuvel Farm, Shangani	J. W. Spencer	11	8	13
Hartley	Hartley	J. de L. Nimmo	..	..	..
Headlands	Headlands	J. M. Harvard	25	..	27
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	11	8	13
Insiza—Shangani	Shangani	T. E. Penny	..	1	..
Inyanga	Farm Cheshire	F. W. Thiel	25	29	27
Inyazura	Inyazura	A. C. Curling	15	19	17
Iron Mine Hill	Iron Mine Hill	T. Irving	11	8	13
Lalapansi	Lalapansi	N. A. Bradford	18	15	20
Lomagundi	Sinoia	A. H. Layard	18	22	20
Lydiate	Norton	W. Wrench	25	29	27
Macheke	Macheke	J. Cheyne		No fixed dates	
Makwiro	Makwiro	C. D. Voigt	17	21	19
Marandellas and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	4	1	6
Makoni	Rusape	H. Barnes Pope	4	1	6
Makoni North	———	———	25	29	27
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	1	5	3
Matopo Branch, R.L. and F.A.	Sibali	———	..	12	..
Mazoe	Glendale Siding	A. G. McCall	1	12	10
Melsetter (North)	Various farms	Rev. R. Wodehouse	..	1	..
Midlands	Gwelo	A. Cox, Box 93, Gwelo	10	14	12
Northern Umtali	Farm Summerfield	R. O. H. Blurton	4	..	..
Norton and District	Norton Store	H. Grimmer	4	1	6
Que Que	Que Que	E. J. Ross	18	15	20
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	31	28	26
Shamva	Shamva	Wm. Scott	..	19	..
Selukwe	Selukwe	F. S. Clark		No fixed dates	
Somabula and Shangani Flats	Weltevrede School	G. B. Botha	..	8	..
Umvukwe	Various ranches	H. K. Bracewell	11	8	13
Umtali	Christmas Pass Hotel	J. S. Holland	4	1	6
Victoria	Victoria	John Rennie	3	7	5
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	11	8	13

Departmental Notices.

Information for Farmers

The Department of Agriculture is prepared to furnish to farmers technical advice either by correspondence, or, where possible, by personal visits. All communications should be addressed in the first instance to the Director of Agriculture.

Crops

The Agricultural Branch deals with enquiries relating to agricultural practice, soils, crops, cultural operations, processes, seeds, trees, farm implements and machinery, etc.

Disposal of Pure Seed.

Farmers devoting special attention to the production of pure seed of any locally grown crops are invited to communicate with the Government Agriculturist, and at the same time to submit a ¼ lb. sample of any seed which they may have for disposal.

In addition to indicating the total amount of seed offered and the price f.o.r. the nearest railway station or siding, the correct name of the variety and the origin of the seed from which the crop was grown should be given. In the case of special attention having been devoted to seed selection, the methods employed should be described.

Where these stipulations are complied with, and the samples forwarded are deemed by the Agriculturist of sufficiently high quality for seed purposes, growers and intending purchasers will be put in touch with one another. It is hoped by this means to encourage the production of pure seed, and growers are urged whenever possible to sell their seed under guarantee of trueness to name, type and sample deposited with the Department.

After placing growers and would-be purchasers in touch with one another, the Department can accept no further responsibility except in the position of adjudicator when bulk supplies are thought inferior to sample and description, in which case both parties will be required to abide by the decision of the Department.

For further particulars see article on Pure Seed Supply. *Rhodesia Agricultural Journal*, February, 1914.

Farm Seeds

The undermentioned seeds grown on the Government Experiment Farms are offered for sale at the prices stated. The amounts available are limited, and it is not expected that more than two or three bags of maize seed can be supplied to any one applicant.

The prices quoted are f.o.r. Salisbury, or, when available, from the Gwebi Experiment Farm. The distribution of seed will commence from the 1st September, except in the case of Napier's fodder, which will be distributed from the 1st December only. Napier's fodder will be sold in bags containing approximately 200 roots, but no guarantee can be given of the exact number contained in each bag.

On account of the limited supply available in some cases, it is impossible to guarantee the full delivery of any order. *Farmers are therefore requested not to enclose cheques until they are advised as to the amount of seed allotted to them.* The seeds are consigned carriage forward in the case of stations. In the case of sidings the amount of railage will be notified after despatch.

All orders for seed must be addressed to the Government Agriculturist, Department of Agriculture, Salisbury.

1. Specially selected seed maize, Salisbury White, Hickory King 10-row and Hickory King 8-row, 15s. per 100 lbs.

The above shelled seed has all been carefully selected, tipped, butted and hand-shelled.

2. Boer manna seed, 3d. per lb.
3. Buckwheat (Japanese), 10s. per 100 lbs.
4. Castor oil beans, 2d. per lb., 15s. per 100 lbs.
5. Dhal (ordinary), 2d. per lb., 15s. per 100 lbs.
6. Ground nuts (Spanish and Virginia Bunch), 15s. per 75 lbs.
7. Linseed (white flowering), 6d. per lb.
8. Melon (Makamaan), 1s. per lb.
9. Melon (majorda), 1s. per lb.
10. Oats (Kherson's 60-day), 24s. per bag of 120 lbs.
11. Pumpkin (iron bark), 2s. per lb.
12. Sudan grass seed, 2s. 6d. per lb.
13. Sunflower (black seeded), 2d. per lb., 15s. per 100 lbs.
14. Teff grass seed, 3d. per lb., 10s. per 50 lbs.
15. Velvet bean seed, 25s. per 100 lbs.
16. Wheat (Yellow Cross), 15s. per 100 lbs.
17. Napier's fodder roots, 5s. per bag containing approximately 200 roots.

Co-operative Seed Distribution

The following seeds of summer crops are offered f.o.r. Salisbury for trial under the usual terms of co-operative experiments. The experimenter is required at the close of the season to forward to the Agricultural Department, on forms supplied for that purpose, an accurate report of the result of his experiments.

Seed is supplied in sufficient quantity to sow from ¼ to 1 acre according to variety, and not more than four varieties can be sent to any one applicant. All applications, together with full particulars regarding forwarding, should be addressed to the Government Agriculturist, Department of Agriculture, Salisbury.

1. *Summer Cereals.*—Yellow Cross Wheat, Barley Wheat, Rye, Kherson Oats.
2. *Oil Seeds.*—Linseed, Castor Oil, Sunflower, Chili Oil Seed and Niger Oil Seed.
3. *Leguminous Crops.*—Velvet Beans, Dhal, Cowpeas, Beggar Weed.

4. *Hay Crops.*—German Millet, Boer Manna, Sudan Grass, Teff Grass.

5. *Root Crops.*—Mangels (five varieties).

6. *Fibre Crops.*—Sunn Hemp, Mauritius Hemp, Sisal Hemp, Ramie.

7. *Pasture Plants.*—Paspalum, Napier's Fodder Roots.

8. *Miscellaneous.*—Buckwheat, Majorda and Makamaan Melons, Kale.

Poisonous Plants

It is of great importance that as soon as possible a study should be made of those plants found in Southern Rhodesia which are poisonous or deleterious to small or large stock. Farmers and others who have known, or suspected poisonous plants on their property, are requested to communicate with the Government Agriculturist and Botanist, Department of Agriculture, Salisbury, at the same time forwarding specimens of the plant, including stem, leaves, flowers, and, where possible, fruit. Any particular regarding the habits of the plant will be welcomed, and in return the Department will supply all available information regarding the plants.

Live Stock

The Animal Industry Branch is prepared to advise with regard to all matters connected with stock breeding, selection, feeding and registration of stud animals, the dairy industry, poultry management, farm buildings for stock, and kindred subjects. Buyers and sellers of stud stock in Rhodesia are also put in touch with one another.

Entomology

The Government Entomologist advises on matters connected with insect pests of live stock, crops, and fruit trees, and also undertakes the inspection of nurseries and of the importation of plants from abroad.

Chemical Analyses

The Government Agricultural Chemist deals with matters relating to the composition of soils, fertilisers, farm produce of vegetable or animal origin; also the investigation of poisons and of articles of potential economic value.

Nominal charges are made, which, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

A schedule of charges and directions for taking samples will be furnished on application.

With all analyses, reports will be furnished explanatory of the results and, when possible, advice given as to the nature, properties and value of the material.

No charge will be made for analysis where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Citrus Culture

The Government Citrus Adviser advises on all matters connected with the citrus and deciduous fruit industry.

Services of Government Veterinary Surgeons

1. The services of Government Veterinary Surgeons are available to the public, free of charge, for the following purposes only :—

(1) Attending and giving professional advice in connection with the following diseases, viz. :—Anthrax, Contagious abortion, East Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Foot-rot, Heartwater, Glanders, Intestinal parasites amongst sheep and goats, Liver Disease, Lungsickness, Osteo Porosis, Malarial Catarrhal Fever (blue tongue), Rabies, Redwater, Rinder-

pest, Scabies, Sponziekte (quarter evil), Swine Fever, and any other diseases which may in future be scheduled in terms of section 3, sub-section 18 of the "Animals Diseases Consolidation Ordinance, 1906." Attending to cases of disease amongst live stock which, though not of a contagious or infectious character, may be of general public importance.

(2) Applying tests in regard to Glanders, Tuberculosis, or any other disease against the introduction or spread of which tests are applied under regulations.

(3) Inoculations against the following diseases :—

Horsesickness, Lungsickness, Anthrax, Quarter Evil, Redwater, Malarial Catarrhal Fever (blue tongue). A fee to cover the cost of serum and virus will be charged.

2. The following charges shall be made and payable for services rendered by the Government Veterinary Surgeons in other cases, viz. :—

	£	s.	d.
(1) For every professional visit within three miles of his office or residence	0	5	0
(2) For every professional visit beyond such distance	0	10	6
plus an additional charge of 2/6 per hour whilst engaged in such visits or £2/2/0 a day of 24 hours;			
(3) For advice given at the Veterinary Surgeon's office, for each animal, per visit	0	2	6
(4) The following to be charged in addition to visiting fees :—			
a. For every examination as to soundness, each	1	1	0
b. For castration, horses, each	1	1	0
c. For castration, bulls, each	0	5	0
d. For castration, donkeys, each.. ...	0	10	6
e. For parturition cases, mares, each	2	2	0
f. For parturition cases, cows, each..	1	1	0
g. For other operations, according to nature, from 5/- to £2/2/0.			

3. Double the above fees will be payable for services rendered on Sundays, public holidays, and between the hours of 7 p.m. and 7 a.m.

4. Applicants for the services of Government Veterinary Surgeons must at their own cost provide the necessary transport for the conveyance of these officers from, and back to, their residence or nearest railway station.

5. Farmers and owners of stock throughout the country frequently telegraph for a Government Veterinary Surgeon to be sent to attend an animal which has been taken seriously ill. It is rarely possible to comply with these requests at once, as the Veterinary Surgeon may be engaged on duty which he cannot leave, or is at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the veterinary staff discredited. To obviate this, in all cases where veterinary advice and assistance are required, the owner should telegraph to "Veteran," Salisbury, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This will enable the Chief Veterinary Surgeon to telegraph advice at once and state whether he is able to arrange for veterinary attendance on the case or not, and save valuable time, which is always of importance in acute cases.

6. The services of Government Veterinary Surgeons will only be available for private work with the consent of such officers, and when such work does not interfere with their official duties, or when the services of a private practitioner are not available.

7. As the arrangement of allowing Government Veterinary Surgeons to attend to private cases is intended purely for the benefit of farmers and stock-owners who may wish to obtain professional advice, no responsibility whatever will be accepted for any loss of stock, etc., which may result from the negligent treatment or advice, or wilful default, of any Government Veterinary Surgeon.

8. All fees collected in terms of these Regulations are payable to the Treasury through the local Receiver of Revenue.

Irrigation

From the Agricultural Engineer assistance may be obtained by farmers for the following :—

1. In the locating of possible irrigation projects.
2. In the preparation of surveys or plans and for irrigation works, including weirs, dams, furrows, pumping plants, and determining the extent of land which may be brought under irrigation schemes, together with rough estimates of costs.
3. In the supervision of construction and carrying out of projects.
4. In the selection of suitable sites for boring operations.
5. Preparing specifications, etc., regarding pumping plants, windmills, and agricultural machinery.
6. Giving general advice on cognate subjects.

Informal advice of a general character will be given to applicants making enquiry by letter or in person. Any applicant desiring professional assistance likely to occupy more than one day should apply for advice in writing. All applicants should specify clearly the nature of the project on which they seek advice, and should give full particulars as to the distance and direction of their farms from some well-known centre. Applicants will be required to provide suitable means of transport for the officer concerned during the period devoted to work on the spot; to provide any unskilled labour that may be required; and to provide for any other contingent services. Applications should be addressed to the Director of Agriculture, who will endeavour to arrange visits as far as possible in order of application, but with due regard to situation, in order to obviate unnecessary travelling and delay. The services of the Agricultural Engineer are given free, but in cases demanding prolonged individual attention, or repeated supervision, a charge may be made according to circumstances.

Samples

In connection with enquiries, especially with regard to diseases amongst crops, insect pests, soils, grain and the identification of plants, specimens should, wherever possible, be

sent, together with full details. It is found that such parcels are often forwarded without any indication of where they are from or why they were sent and it is difficult in such cases to trace the sender. It is, therefore, requested that persons when forwarding samples for examination, indicate clearly their names and addresses on the packages, so as to enable their requirements to be attended to without delay.

The Analysis of Agricultural Products, Soils, Water, etc.

SCALE OF CHARGES.

Arrangements have now been made for the chemical examination of soils, grain, and other produce, oil-seeds, milk, water, fertilisers, etc., on behalf of farmers and others by the Chemist attached to the Department of Agriculture. The charges made, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject, should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

Schedule of Charges.	£	s.	d.
1. Partial analysis of a manure or feeding stuff, for each constituent	0	5	0
2. Complete analysis and valuation of a manure or feeding stuff	1	0	0
3. Analysis of agricultural products; *e.g.*, grain, hay, roots, etc.	1	0	0
4. Analysis of water for agricultural purposes, irrigation or drainage	1	5	0
5. Partial analysis of soil to determine fertility and recommendations as to manurial treatment	2	0	0
6. Complete analysis of a soil	3	0	0
7. Milk—determination of total fat and solids ...	0	5	0
do. do. of fat only	0	2	6
do. complete analysis	0	10	0
8. Cream—determination of fat only	0	2	6
do. complete analysis	0	10	0

	£	s.	d.
9. Analysis of cheese	0	10	0
10. Limestone—estimation of percentage of lime	0	5	0
do. complete analysis	1	0	0

Remittances should accompany samples submitted.

No charge will be made where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Directions for Taking Samples of Soils.

It is recommended to select four or five spots at least, per acre, taking care that these represent as far as possible the general character of the soil of the field. If the soil of the area to be reported upon presents notable differences, the samples gathered from the different parts must be kept separate.

Having selected a proper spot, pull up the plants growing upon it and remove surface accumulations of decaying leaves, etc., if any. Dig a hole about twelve inches deep and trim one side so as to be smooth and vertical; from the side so prepared remove with the aid of a sharp spade a slice of uniform thickness—about three or four inches—down to a depth of nine inches. Place the slice on a clean board or cloth and mix thoroughly with similar slices obtained in the same way from other parts of the field area. About six pounds of the mixture are then placed in a clean cloth bag or wooden box. Forward with the sample the following particulars:—

Date of collection, exact location, position (hillside, vlei or flat), peculiarities of soil or sub-soil, behaviour in wet and dry seasons, crops borne, previous manurial treatment, and every circumstance in fact which will throw light on its agricultural qualities.

Directions for Taking Samples of Grains, Produce and Feeding Stuffs.

Grains, meal and feeding stuffs and all agricultural produce should be sampled in the same manner as prescribed for fertilisers.

When the feeding stuff is in the state of cake, select not less than three cakes where the quantity does not exceed one

ton, not less than five cakes when the quantity does not exceed five tons, and not less than ten cakes when the quantity exceeds five tons.

Break the selected cakes into small pieces, mix them together, and take the sample—not less than one pound—from the mixture.

Directions for Taking Samples of Fertilisers.

If delivered in bags, select not less than two bags when the quantity does not exceed one ton, and one additional bag for every additional ton.

In no case need more than ten bags be selected.

Empty the selected bags separately on to a clean wooden or stone floor. Thoroughly mix the contents, and set aside one spadeful from each bag, mix together the separate spadefuls, and from the mixture take about one pound as a sample.

If the fertiliser is in bulk, mix together portions taken from the different parts, and draw the sample from the mixture.

Directions for Taking Samples of Water.

All samples should be sent in glass bottles. Stoneware jars are to be avoided. The bottles should preferably be provided with glass stoppers; if corks are used, they must be new and well washed previously in pure water.

In sampling a stream or tank, before taking the samples rinse out the bottle several times with water, taking care to avoid the introduction of mud or sediment.

Before taking a sample of water from a pipe, allow the water to run through it for a few minutes at full pressure.

In all cases, before the sample is taken, always rinse out the bottle several times with the water to be sampled.

Quantity to be taken: 1 gallon.

Directions for Taking Samples of Milk and Cream for Butter-Fat Determinations.

The bulk from which the sample is to be drawn should be first poured two or three times from one vessel to another, and about half-a-pint forwarded for examination.

If it is impossible to deliver the sample in a fresh condition, introduce into each sample bottle about as much of the following preservatives as can be held upon a threepenny piece:—Borax, boric acid or salicylic acid; stating which preservative has been used.

All bottles used must have been previously cleansed with boiling water.

Charges for Dipping Cattle at Government Dipping Tanks.

A charge of 1d. per head is made in respect of all cattle dipped at Government dipping tanks.

Unweaned calves will be dipped free of charge.

Payment may be made in cash or by means of books of coupons at £1, 10/- and 2/6, which can be obtained from Civil Commissioners, Native Commissioners, or through all Veterinary Surgeons and Cattle Inspectors.

The tanks to which these provisions at present apply are the following :—

Salisbury (3), Bulawayo (3), Umtali, Penhalonga, Melsetter, Marandellas, Macheke, Mazoe, Lomagundi, Hartley, Gwelo, Selukwe, Enkeldoorn, Victoria, Gwanda, Gatooma, Que Que, Umvuma, Kimberley Reefs.

Lectures for Farmers

The services of certain of the officers of the Department of Agriculture and the Veterinary Department are available for purposes of delivering lectures on subjects upon which they have special knowledge. As far as practicable, lectures will be accompanied by demonstrations at the time or subsequently in the field. Owing to the many calls on the time of the staff and the exigencies of their duties, alternative dates are desirable in order to avoid disappointment. The following topics are

offered as examples of subjects that may be dealt with in this manner, but the suggestion of other themes is invited.

Agriculture.—Maize growing; Maize selection and maintenance of the breeding plot; Points of maize and maize judging, with demonstrations; Utilisation of granite vlei soils; Ground nut culture; Rotation crops for home use and for sale; Veld improvement by winter grasses; Production of foodstuffs for the mines; Ensilage; Fungoid diseases of maize and wheat; Wheat, oats and lucerne under irrigation; The prospects of cotton culture in Southern Rhodesia.

Veterinary Hygiene.—Detection and prevention of disease; The care of live stock.

Live Stock.—Judging of cattle according to breeds, and for beef, milk and draught; feeding and kraaling of live stock: general principles of cattle breeding; management of imported stock; grading up of native or local stock with pure bred bulls.

Dairying.—Home butter-making; building and equipment of a farm dairy; handling and marketing of milk; packing and marketing of butter; construction of cow houses.

Swine Husbandry.—Breeding and feeding of swine; some suggestions for the production of first-class bacon pigs; construction of piggeries at moderate cost.

Chemistry.—The principles of soil fertility; the principles of manuring; the value of lime in agriculture; chemistry of milk and its products (accompanied by demonstrations in milk-testing).

Entomology.—Economic entomology on the farm; the role of insects and their allies in the transmission of disease; scale insects and fruit trees and methods for their control; insect pests and maize; enemies of the potato, insect and fungus; the value and objects of plant import and nursery regulations.

Irrigation.—Methods of applying water to land for irrigation; the measurement of water in connection with irrigation; canal irrigation; storage reservoirs; hints on the selection of sites and on the design of earthen and other dams; irrigation by pumping, with notes on the selection of plants.

Enquiries and invitations should in the first instance be addressed to the Director of Agriculture, Salisbury.

Botanical Specimens for Identification.

In all cases where a botanical identification is required it is of the utmost importance that the specimens reach the Department of Agriculture in a thoroughly dry condition, free from mildew, and intact, that is not broken in pieces. Whenever possible specimens should comprise main stem or small branch, leaves, flowers, seed vessels and roots and bulbs, though these need not necessarily be on the same plant.

The colour of the flowers and the general form of the plant should be preserved by pressing and drying between two sheets of blotting paper or newspaper. Ordinary plants not excessively succulent can be dried sufficiently in three days, provided the drying papers are changed every day. A heavy weight should be placed on the specimens in order to press them flat.

Correspondents are asked to supply the following particulars as far as possible:—

(a) height and general appearance of plant or tree;
(b) class of soil on which found;
(c) locality and altitude;
(d) supposed use or properties.

It is advised that specimens be packed between two sheets of cardboard or thin wood, since in this way they will travel long distances without fear of injury.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only:—

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultural Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 30[illegible] The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E.

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 126. Turkish Tobacco.
No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. Tobacco Culture (Virginia)—Harvesting and Curing.

No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 251. Cultural Notes on Onions, by J. A. T. Walters, B.A.
No. 252. Cultural Notes on Buckwheat, by J. A. T. Walters, B.A.
No. 253. Wheat Production in Southern Rhodesia.
No. 258. Winter Wheat, by J. A. T. Walters, B.A.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworn, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.
No. 261. Turnip Sawfly, by R. W. Jack, F.E.S.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.

No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.

No. 53. Animals Diseases Consolidation Ordinance, 1904.

No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.

No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.

No. 95. Oestrus-ovis in Sheep, by Alec King.

No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.

No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.

No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.

No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.

No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.

No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.

No. 223. A Note on Contagious Abortion, by Ll. E. W Bevan, Government Veterinary Bacteriologist.

LIVE STOCK.

No. 96. Swine Breeds and Breeding of, by Loudon M. Douglas, F.R.S.E.

No. 145. Prospects for Importation of Cattle from Australia, by Eric A Nobbs, Ph.D., B.Sc.

No. 161. Notes on Cattle Breeding, Part III., by R. C. Simmons.

No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.

No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R. C. Simmons.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.

No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.

No. 242. Construction of Dipping Tanks (Revised).

No. 243. Shedding for Milch Cows, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.

No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.

No. 134. Plans and Specifications for Flue Curing Tobacco Barns.

No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.

No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.

No. 157. Hints on Brickmaking, by G. T. Dyke.

No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.
No. 183. The Rainy Season in Southern Rhodesia, by the Rev. E. Goetz, S.J.
No. 184 Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.
No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.
No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.
No. 199. Eucalypts for the Farm, by J. J. Boocock.
No. 205. Home Butter Making, by R. C. Simmons.
No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
No. 213. Hydraulic Rams, by W. Martin Watt.
No. 217. Windbreaks and Hedges, by F. B. Willoughby.
No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 226. Classification of Clouds.
No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.
No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.
No. 237. The Analysis of Agricultural Products, Soils, Water, etc.
No. 241. Hints on Cement Concrete, by W. M. Watt.
No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.
No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist.
No. 254. Hints on Explosives, by W. M. Watt.
No. 255. Pound Fees.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 257. Maize Grading, by J. A. T. Walters, B.A.
No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 260. Rhodesian Farm Orchard, by A. G. Turner.
No. 263. How to Build a Cattle Crush (two methods), by J. H. Fleming and R. C. Simmons.
No. 264. Nature Notes—Adaptation, by C. F. M. Swynnerton, F.L.S.
No. 265. Rose Culture, by N. L. Kaye Eddie.
No. 266. Directory of Farmers. (Price 1s.)
Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.
Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.
Game Law: Summary of.
Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Employment on Farms.

The Department of Agriculture receives numerous enquiries from persons of varied attainments, age and financial position for openings on farms, as managers, assistants and learners, requiring remuneration on corresponding scales, or willing to give services in return for keep.

In order that work may be found for the above and needs of farmers met, applications are invited from both employers and persons seeking employment. Applications are also invited from artisans, such as masons, bricklayers, carpenters, fencers, well sinkers, concrete workers, and the like who may desire work on farms. In cases where employers have obtained the labour they require, or applicants for employment have found work, it is requested that notification be at once sent to the Department of Agriculture, in order that unnecessary correspondence be avoided.

Replies to the following applications should be addressed to the initials of the advertisers, c/o Director of Agriculture, who will forward the letter to the party referred to.

Note.—The following advertisements will not be repeated unless the advertisers inform us they wish them to be continued:—

SITUATIONS WANTED.

S. D. C.—As learner or assistant, young man discharged after service in East Africa.

P. F. S.—As manager; experience: 15 years' Colonial and 3 years' Rhodesian; cattle and general farming. Married. Salary or salary and shares.

H. C.—As handy man on farm; experience in building, brick and stone work.

W. D. H.—As farm or ranch manager, by sober, trustworthy man; married; one child; age 29. Practical and scientific knowledge of agriculture and live stock. Speaks and writes English, Dutch and Rhodesian native languages; accustomed to handle natives. Disengaged 1st October. References.

SITUATIONS VACANT.

T. S.—Tobacco grower wishes young man to superintend natives, etc. Good prospects for suitable man.

H. C. K.—Assistant with knowledge of mixed farming, native language and experience in management of natives.

J. M.—Manager with knowledge of orchard work.

R. H. D.—For pupil on developed farm, good accommodation, board and lodging in exchange for services.

Government Notices

No. 21 of 1917.] [19th January, 1917.

REGULATIONS FOR CONTROLLING THE MOVEMENT OF CATTLE.

1. UNDER and by virtue of the powers vested in him by the "Animals Diseases Consolidation Ordinance, 1904," His Honour the Administrator has been pleased to cancel and withdraw Government Notices Nos. 50 and 189 of 1912, 329 and 383 of 1914 and 259 and 320 of 1916, and to make the following provisions in lieu thereof; provided, however, that areas of infection and guard areas fixed under the terms of Government Notice No. 50 of 1912 shall be areas of infection and guard areas for the purposes of these regulations.

2. The various districts of Southern Rhodesia are hereby declared infected for the purposes of section 5 (2) of the aforesaid Ordinance, and, save as hereinafter set out, all movement of cattle within the said districts is prohibited until further notice.

3. The following shall be regarded as places within the boundaries of which the movement of cattle may be allowed without special permission :—

(a) Single farm.

(b) An area occupied by an owner or lessee, under one management, comprising contiguous farms and situated within an area fixed under section 9 hereof. The mere possession by an owner or lessee of grazing rights over a contiguous farm or farms shall not constitute occupation of such farm or farms.

(c) An area the property of one owner.

(d) For grazing purposes, an area within a radius of four miles of native krauls situated on unalienated land or in reserves, save and in so far as such area includes any private land.

The sites of such krauls shall be deemed to be the places where they are situated at the date of promulgation of these regulations.

(e) An area under the management or control of any Municipality, Sanitary Board or Village Management Board.

4. Notwithstanding the provisions of the last preceding section or of section 9 hereof, the Chief Inspector may, on the outbreak of disease or for such other cause as may be deemed expedient, direct the isolation or quarantine of cattle on a limited area of the aforesaid places.

5. The movement of cattle from place to place may be permitted under the special permission, in writing, of the Controller of Stock, the Chief Inspector, Inspector, Sub-Inspector or other officer or person duly authorised by the Administrator to grant such permission.

6. No permission as aforesaid shall permit the movement of cattle—

(a) Without the written consent of the owners, occupiers or managers of occupied land, and, in the case of native reserves, of the Native Commissioner of the district over which land or reserve such cattle will pass, whether along roads or otherwise; provided, however, that refusal to grant such consent shall be in writing, and provided further that if the Controller of Stock or the Chief Inspector shall consider that such consent is withheld without good and sufficient cause he may permit of movement without such consent.

If any such person mentioned above refuse to give consent or to state a reason for refusing to do so, in writing, no valid objection shall be deemed to exist, and movement may be permitted without such written consent.

(b) Through or to an area without the consent of the Cattle Inspector in charge of such area.

7. Cattle moved to any centre for slaughter under the provisions of these or any other regulations shall, on arrival, be immediately taken to such quarantine area (if any) as is provided for the purpose.

8. Cattle admitted to a quarantine area, in terms of the last preceding section, shall be slaughtered within twenty-one days of the date of admission, and shall not be permitted to leave the same except for the purpose of being slaughtered at the appointed abattoir, and if found outside such area, except for the said purpose, may be destroyed on the order of the Controller of Stock or the Chief Inspector; provided, however, that the Chief Inspector may allow the removal of cattle from such area under such conditions as he may prescribe.

9. The movement of cattle in use for draught purposes may be permitted under the provisions of sections 5 and 6 hereof within the boundaries of areas fixed from time to time by the Administrator; provided, however, that permits issued in respect of such movements may authorise the use of such cattle over defined roads for specified periods.

10. All cattle used for draught purposes, except in the areas defined by section 3, sub-sections (a), (b) and (c), shall be clearly and distinctly branded with the registered brand of the owner.

11. All wagons or other vehicles drawn by cattle, in terms of the preceding sections, shall have the owner's name and address legibly and permanently inscribed on the right side thereof.

12. Whenever the owner, occupier or manager of a farm shall adopt means of cleansing cattle running thereon, either by spraying, dipping or by any other method, the Chief Inspector may order any natives or other persons having cattle on the same farm to cleanse such cattle, and the Native Commissioner of the district within which the farm is situated may enter into an arrangement with the native owners of cattle to cleanse such cattle at a charge to be mutually agreed upon between the said owner, occupier or manager and the said native owners.

13. All permits for the removal of cattle issued under the provisions of these regulations shall specify legibly and clearly on the face thereof the place from and to which such cattle may be removed, the route by which they shall travel, the number of such cattle, the time allowed for the journey, and such other particulars and conditions as it may be deemed expedient to provide.

14. No permit issued for the movement of cattle shall be taken to authorise any trespass in connection with such movement.

15. Notwithstanding the provisions of these regulations, it shall not be lawful for any owner of cattle to allow any such cattle to be on any road, public outspan, commonage, or any property other than that of the owner, unless they are free from ticks. Any beast having ten or more ticks on it shall not be considered free from ticks.

16. The following provisions shall apply to areas infected with African Coast Fever.

17. On the outbreak or suspected outbreak of disease the Administrator may declare an area of infection around and embracing the place of outbreak or suspected outbreak, and a further area or areas around such area of infection as a guard area, whereupon all movement of cattle into and from place to place within such area or areas shall be immediately suspended, except as is hereinafter provided.

(1) In areas of infection and guard areas :—

(a) Cattle in transit by rail may be moved through such area.

(b) Cattle from beyond the borders of Southern Rhodesia may be detrained within such area or areas *en route* to destination for the purpose of being fed or watered or transferred to another truck.

(c) The Chief Inspector may, under such safeguards as he deems expedient, allow cattle to be brought into and thereafter leave any such area for a point outside thereof; provided that they are brought in by rail for the purposes of inoculation or *en route* to their destination.

(d) Cattle for *bona fide* farming, dairy and slaughter purposes may be moved into such area or areas by permission of the Chief Inspector and under such conditions as he may impose.

(2) In guard areas only :—

Cattle may be moved into and from place to place within such area under the conditions of section 6 hereof.

18. A permit for a terminal movement of cattle into an infected or guard area, or from one place to another in a guard area, shall authorise the drawing of a wagon or other vehicle by such cattle.

19. The removal of green forage, hay, fodder, bedding, reeds, manure or of such other articles as may reasonably be supposed capable of conveying infection, shall be prohibited from areas of infection, save and except with the special permission of the Administrator.

20. Every person within an area of infection or guard area, or within such further area as may be specified by Government Notice, owning or in charge of cattle, shall, upon the death or slaughter because of disease, suspected disease or accident of any such cattle, immediately report such occurrence through the nearest Cattle Inspector, Native Commissioner or Police Officer to the District Veterinary Surgeon.

21. In areas of infection no cattle shall be destroyed and no *post-mortem* examination shall be held on any cattle without the consent of an Inspector or Sub-Inspector.

22. Notwithstanding the provisions of these regulations, it shall be competent for the Chief Inspector to authorise and direct the movement of cattle—

(1) for the purpose of isolating, dipping, quarantine or any other such objects as may be deemed necessary to prevent or suppress an outbreak of disease;

(2) for the purpose of obtaining food and water;

at his discretion and under such conditions as he may prescribe.

23. Whenever an area shall have been declared an area of infection or guard area, any person who shall by his own act or neglect or that of his herds allow any cattle to stray or be otherwise removed, except as provided for in these regulations, from any one place within such area to another place, or from a place outside of to a place within such area, shall be guilty of an offence against these regulations.

24. In all areas of infection and guard areas, sheep and goats shall be dipped at such periods as may be directed by the Chief Inspector.

25. Any person contravening the provisions of these regulations or the conditions set out in permits issued thereunder, shall, where no higher penalty has been by the said Ordinance or any other law provided, be liable in respect of each offence to a fine not exceeding £20, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

No. 178 of 1917.] [18th May, 1917.

HIS Honour the Administrator in Council has been pleased to approve of the subjoined regulations with respect to the dipping of cattle.

In areas where the dipping of cattle is compulsory under the provisions

of the "Animals Diseases Consolidation Ordinance, 1904," or the "Compulsory Dipping Ordinance, 1914," any arsenical preparation the arsenical content whereof is not less than that of the arsenical solutions prescribed below for dipping at intervals of three, seven and fourteen days shall be an approved dip.

For three-day dipping.—A solution containing the equivalent of .08 per cent. arsenious oxide.

For seven-day dipping.—A solution containing the equivalent of .16 per cent. arsenious oxide.

For fourteen-day dipping.—A solution containing the equivalent of .24 per cent. arsenious oxide.

AFRICAN COAST FEVER.

Areas of infection and guard areas declared in terms of Government Notice No. 21 of 1917.

Melsetter and Umtali Native Districts.

(a) *Areas of Infection.*

The farms Enhoek, Wolvedraai, Joppa, Ravenswood, Rookwood, Roslyn, Cecilton, Woodstock, Ostend, Diepfontein, Moosgwe, Lombard's Rust, Wolverhampton, Helvetia, Thabanchu, Johannes' Rust, Geluk, Morgensen, Kronstad, Jameson, The Ranche, Rocklands, Weltevreden and Umzila.

(b) *Guard Areas.*

The native district of Melsetter, and that portion of the native district of Umtali lying south of a line drawn from the junction of the Odzi and Impodsi Rivers, up the Impodsi River to its junction with the Shetora River, and up that river to the farm Butler North, thence along the northern boundary of that farm and the northern and eastern boundaries of the farm Banti North to the Portuguese border.

Victoria Native District.

(a) *Areas of Infection.*

The farms Lounton and Erichsthal, and the farms Glenlivet and Midwaters.

(b) *Guard Area.*

The native district of Victoria.

Native Districts of Salisbury and Hartley.

(a) *Areas of Infection.*

1. Farm Waterfall and sub-divisions.
2. Farm Hopley.

(b) *Guard Area.*

An area bounded by and including the following farms:—Oatlands, Whitecliff, Parkridge, Cheriton, Hindon, Tynwald, Mabel Reign, Avondale, Mount Pleasant, Salisbury Commonage, Rietfontein, Colne Valley, The Grange, Chikirubi, Manresa, Cleveland Dam Reserve, Ventersburg, Adelaide, Deanesbrook, Buena Vista, Dunedin, Seki Reserve, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Brechin and Elladale.

Gwelo Native District.

(a) *Area of Infection.*

An area comprising the following farms:—Riverbend, Sunbury, Cross Roads, Wegdraai and Reserve.

(b) *Guard Area.*

An area bounded by a line drawn from the south-western beacon of Adair, along the western boundaries of that farm and Barkley and along the southern boundary of Boschkloof, and along the western boundaries of Long Valley and Northfield; thence by and including that portion of the

Main Belt Block comprising the following farms: Melrose, Nettlethorn, Penderry, Ripple Creek, Quorn, Orpheus, Beere Manor, Irene, Redfields, Glen Arroch, Riverside, Woodridge and Ryecroft, and thence from the north-east beacon of Doon along the eastern boundary of that farm; thence along the southern boundaries of Erin and Igoga to the Bembesaan River; thence up this river to the south-eastern boundary of Rhodesdale Estate; thence southerly along this boundary to the farm Wyanko; thence to the most easterly beacon of the Que Que Reserve; thence following the south-eastern and western boundaries of this reserve to the farm Ermelo, and along the south-eastern and south-western boundaries of that farm and the southern and western boundaries of Barton to the first-named point.

NATIVE DISTRICT OF UMTALI.

(a) *Area of Infection.*

Farm Engwa.

(b) *Guard Area.*

An area bounded by a line drawn from the junction of the Odzi and Impodsi Rivers, up the latter to its junction with the Shetora River; thence up this river to the north-west beacon of the farm Butler North; thence along the northern boundary of this farm and the northern and eastern boundaries of Banti North to beacon No. 45 on the Anglo-Portuguese boundary; thence in a northerly direction along this boundary to the north-east beacon of the farm Brown Hill and along the northern boundary of this farm to its north-west beacon; thence along the eastern boundary of Mazonwe to its north-east beacon; thence along the northern boundary of Mazonwe and the northern and western boundaries of Clydesdale to the north-east beacon of Stewarton North and along the northern boundary of this farm to the Odzi River; thence down this river to the first-named point.

NATIVE DISTRICT OF MREWA.

(a) *Areas of Infection.*

1. The Mangwendi and Uzumba Native Reserves.
2. The farm Exeter.

(b) *Guard Areas.*

1. The Maramba and Fungwe Native Reserves.
2. All surveyed farms, with the exception of Dawn, Isleham, Hornsey, Changwe Ranche No. 1 and No. 2 and Murrayfield.

SALISBURY NATIVE DISTRICT.

(a) *Area of Infection.*

The farm Sternblick.

(b) *Guard Area.*

The farms Glen Lorne, Greystone and the Borrowdale Estate.

MAZOE NATIVE DISTRICT.

(a) *Area of Infection.*

The farm Welbeck.

(b) *Guard Area.*

The unalienated land around Mazoe Post Office, the 100 acre lots Poort View and Tatagura.

Note.—The above areas were declared under the following Government Notices:—Of 1916, Nos. 213, 275 and 405; of 1917, Nos. 159, 160, 213, 240, 244, 260, 271, 277 and 281.

No. 179 of 1917.] [18th May, 1917.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—at Waterfall farm, in the native district of Salisbury.

His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area in the native district of Hartley bounded by the Hunyani River and by and including the following farms:—Longlands, Braemar, Dunottar, Cawdor, Tantallon, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Duiker, Sherwood, Idaho, Reserve.

No. 241 of 1917.] [29th June, 1917.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—on the farms Lounton, Erichsthal and Glenlivet, in the native district of Victoria, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area in the native district of Victoria bounded by and including the farms Brentwood, Rockwood, Mayfield, Newlake, Victoria Commonage, Clipsham, Willoughby, Brucehame, Mlinya Reserve, Tentergate, Mgabi Reserve, Morgenster; thence by a line down the Mtilikwe River to the Tshibaka River; thence in a northerly and westerly direction along the boundary of the native district of Victoria to the first-named farm.

Nos. 381 of 1914 and 200 and 266 of 1916.]

COMPULSORY DIPPING.

UNDER and by virtue of the powers vested in me by section 7 of the "Compulsory Dipping Ordinance, 1914," I hereby declare that the provisions of that Ordinance shall be applied in respect of cattle within the following areas from the date of issue of these Notices, dipping to take place at such intervals as the Chief Veterinary Surgeon shall direct.

The areas under the control of the Municipalities of Salisbury, Bulawayo, Gwelo and Umtali, the Sanitary Boards at Gatooma and Victoria, and the Village Management Boards at Que Que, Melsetter, Penhalonga, Marandellas, Hartley, Enkeldoorn, Avondale, Umvuma, Selukwe, Gwanda, Blinkwater, Plumtree and Rusape.

Further, I do hereby declare that a charge of one penny per head will be made in respect of all cattle dipped at Government dipping tanks, except unweaned calves, for which no charge will be made; and one penny in respect of all horses, mules and donkeys, and ½d. in respect of all sheep.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 7 of the "Animals Diseases Consolidation Ordinance, 1904."

GWELO.

An area comprising the following farms:—Main Belt Block farms east of the Long Valley Spruit, Erin, Doon, Krom Rivar, Clearwater, Northfield, Foxton, Harston, Game Park, Riverdale, Long Valley, Bosch Kloof, Barkly, Turffontein, Cross Roads, Wegdraai, Reserve, Shawlands, Roslin, Loads, Riverbend, Sunbury, Garryowen, Ardpatrick, Woodhouse, Adair, Strathfillan, Headwaters, Bendhu, Mnyami, Hillside, Traveller's Rest, Troy, Barton, Ermelo, Lochiel, Umhlali, Mliza, Que Que Reserve and the British South Africa Company's ground between the rivers Que Que and Bembezaan.

MREWA

That portion of the native district of Mrewa lying south of the main Salisbury-Mtoko road.

SOUTH MELSETTER.

All surveyed farms in the native district of Melsetter south of the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge and Biriwiri, including the Ingorima Reserves and Mafusi Reserve, and excluding the farms Umzelezwe, Nyagadzi, Mhungura, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera.

NORTH MELSETTER AND SOUTH UMTALI.

That portion of the native district of Melsetter north of and including the farms Stonehenge, Vooruitzicht, Lindley, Melsetter Commonage, Reserve, Cambridge, Biriwiri, and the Nyanyadzi River; and that portion of the native district of Umtali lying south of the Impodsi River from its junction with the Odzi River to its junction with the Shetora River, thence up the Shetora River to the farm Butler North and including that farm and Banti North.

SALISBURY AND MAZOE.

An area in the Salisbury and Mazoe native districts bounded by and including the following farms:—Lilfordia, Saffron Waldon, Kilworth, Porta, Reserve, Clement's Plot, Warwickshire, Oatlands, Amalinda, The Rest, Langford, Saturday Retreat, Reserve, Odar, Stoneridge, Longlands, Seki Native Reserve, Dunstan Estate, Banana Grove, Mayfair, Galway Estate, Sebastopol, Gardiner, Gilnockie, Cromlet, Learig, Reserve, Meadows, Mount Shannon, Halstead, western portion of Chindamora Reserve, Pote, Valeria, Spelonken, Arnold's, Smithfield, Brundret, Spitzkop, Summerdale, Rockwood, Somerset, Southmoor, Howick Estate, Leeuw's Rust, Klein Kopjes, Oude Kraal, Mooi Leegte, Reserve, Bitton, Syston, The Lily and Killiemore.

HARTLEY.

An area in the native district of Hartley bounded by the Hunyani River and by and including the following farms:—Longlands, Braemar, Dunottar, Cawdor, Tantallon, Edinburgh, Garth, Imbgwa, Luthrie, Ardno, Arbroath, Duiker, Sherwood, Idaho, Reserve.

VICTORIA.

An area in the native district of Victoria bounded by and including the farms Brentwood, Rockwood, Mayfield, Newlake, Victoria Commonage, Clipsham, Willoughby, Brucehame, Mlinya Reserve, Tentergate, Mgabi Reserve, Morgenster; thence by a line down the Mtilikwe River to the Tshibaka River; thence in a northerly and westerly direction along the boundary of the native district of Victoria to the first-named farm.

UMTALI.

An area in the native district of Umtali bounded by a line drawn from the junction of the Odzi and Impodsi Rivers, up the latter to its junction with the Shetora River; thence up this river to the north-west beacon of the farm Butler North; thence along the northern boundary of this farm and the northern and eastern boundaries of Banti North to beacon No. 45 on the Anglo-Portuguese boundary; thence in a northerly direction along this boundary to the north-east beacon of the farm Brown Hill and along the northern boundary of this farm to its north-west beacon; thence along the eastern boundary of Mazonwe to its north-east beacon; thence along the northern boundary of Mazonwe, the northern and western boundaries of Clydesdale to the north-east beacon of Stewarton North and along the northern boundary of this farm to the Odzi River; thence down this river to the first-named point.

Note.—These areas were declared under the following Government Notices:—Of 1915, Nos. 206, 318 and 355; of 1916, Nos. 215 and 226; of 1917, Nos. 180, 249 and 270.

COMPULSORY DIPPING OF CATTLE.

Areas within which dipping of cattle is compulsory under section 2 of the "Compulsory Dipping Ordinance, 1914."

Enterprise—Salisbury.

An area bounded by and including the following farms:—Halstead, Mount Shannon, The Meadows, Ivordale, Ivanhoe, Oribi, Colga, Neptune Mashona Kop, Mashona Vlei, Vuta, Chinyika, Lonely Park, Grazeley Guernsey, adjoining vacant ground, Cromlet, Father Hartmann, Chisha washa, Stuhm, The Springs, The Grove and Umritsur.

Melsetter and Umtali.

All surveyed farms and the Ingorima and Mafusi reserves, in the native district of Melsetter, excluding Umzelezwe, Nyagadzi, Mhunguru, Pangela, Passage, Mangani, Chengwe, Gumera, Umbugu, Nhori, Elongwe and Mamzwera; and including the following farms in the native district of Umtali: Tom's Hope West, Steynstroom, Thabanchu, Penkridge, Macandrews, Cronley and Lisnacloon.

Salisbury, Mazoe and Hartley.

An area bounded by and including the following farms:—St. Mary's, Stoneridge, Odar, Reserve, Saturday Retreat, Chizanza, Suum Cuique, Arbroath, Langford, The Rest, Amalinda, Oatlands, Warwickshire, Clement's Plot, Reserve, Porta, Lyndhurst, Riverside, Herren Hausen, Lilfordia, Killiemore, The Lily, Ballineety, Fairview, Spa, Passaford, Springvale, Mbebi, Umsasa, Great B, Christon Bank, St. Gerera, Willesden Farm, Borrowdale Estate, Luna, Glen Lorne, Gletwyn, Sternblick, Manresa, Caledonia, Sebastopol, Galway Estate, Mayfair, Nalire Reserve, Buena Vista and Seki Reserve.

Makwiro—Hartley.

An area bounded by and including the following farms:—Umfulia, Dorothy Hill, vacant land, Seigneury Reserve, Zimbo Junction, Serui Drift, Strathmore, Scotsdale, Cape Boys' Reserve, Railway Farm No. 22, vacant land between Railway Farm No. 21 and Spencer, Spencer, Railway Farm No. 23, Woodsgift, Railway Farm No. 25, Southwood, Northwood, Niklot, Rothwell Extension, Hunyani Estate, Hunyani Estate No. 2, Stanhope, Cromdale, Garthnor, Serui, Curlewood, Cotswold and vacant land and farms lying within a line from the most easterly beacon of Cotswold to the north-east beacon of Fort Martin, thence to the south-east beacon of Fort Martin and from there due south to the Umfuli River and down that river to the farm Umfulia.

Marandellas and Salisbury.

An area bounded by and including the following farms:—Rakodsi, Longlands, Shepparton (portion of Lendy Estate), Progress, Rockery, Shortlands, Rastenburg, Loquat Grove, Cornwall, Norfolk, Middlesex, Kent, Suffolk, Sussex, Rupture, Argosy, Weir, Inandu, Seaton, Rapture, Sunny Fountains, Mangwendi Mission, Retreat and Springvale.

Shamva—Mazoe.

An area bounded by and including the following farms:—The Carse, Burnleigh, Woodlands, Ceres, Murgwi, Zombi, Chewarika, Maienzi, Maxton, Lone Star Reserve No. 2, Richlands, M. E. D. Reserve, New Brixton, Dillon, Mullingar, Mumwi, Chipoli, Ellerslie, Wolley, Wapley, Lion's Den, and thence from the south-eastern beacon of Lion's Den up the Poorti River to the north-western beacon of The Carse.

Rusape—Makoni.

An area bounded by and including the following farms:—The Willows, The Springs, Howick, Leeuw Poort, Highfield, Emerald, Kirkly Vale, Lawrencedale Estate, Chimbi, Notgotimyet, Diana, Inyagura, Cheira,

Cheira Source, Invercargill, Wick, Makoni Reserve, Mount Zonga, Reserve, Inyamasanga, Windsorton, Manda, Zimati, Mount Tikwiri, Rocking Stone, Lesapi Falls, Recondite, Cheronga and Lesbury.

BINDURA—MAZOE.

An area bounded by and including the following farms :—Wiseacre, Erin, Pimento Park, Duiker Flat, Jesmond Deane, The Ridge, Malvern, Selwood, Marston, Nan Terra, Retreat, Nomansland, Vergenoeg, Caledon, Chiwaridza Reserve, Dengeni, Vredehoek, Arcadia, Hereford, The Vale, Bonny, Wild Dog Valley, Atherstone, Kingston, Hildadale, Cardiff and Poorti Outspan.

HEADLANDS AREA, MAKONI.

An area bounded by the Nyagadzi River from where it intersects the northern boundary of Fairfield Estate, down this river to the Chikore Reserve and along the south-west boundary of this reserve to the Mwaruzi River, and down this river to the Inyongombi River; thence in a southerly direction up this river to the north-east beacon of Rathcline; thence along the northern and western boundaries of Rathcline and western boundary of Bannockburn North, the southern boundaries of Inyati Block and Yorkshire Estate to a point directly opposite to the most northerly beacon of De Vos; thence by and including the farms De Vos, Lone Kop, Moodiesville, Reserve, Netzewa, Fischerville, Wakefield, Urmston; thence up the Macheke River to the southern beacon of Monte Cassino; thence along the southern and eastern boundaries of that farm and from its most northern beacon in a direct line to the south-western beacon of Changwe Ranche No. 1; thence along the northern boundary of Fairfield Estate to the first-named point.

UMVUMA AREA, CHILIMANZI AND CHARTER.

An area bounded by and including the following farms :—Pela, Pansi, Ensimoen, Richmond, Vosges, Kombisa, Kanya, Blackwood, Tshamamvura, Smithvale, Grootfontein, Mtao, Aldebey, Welstead, Lovedale, Central Estates, Sebakwe, Xmas and Bushy Park.

MATABELELAND.

That portion of Matabeleland lying west of a line drawn from a point where the Gwaai River enters the Zambesi River; thence up the former and the Shangani River to the northern boundary of the Karna Block; thence following the northern and eastern boundaries of this block to the Karna River; thence up this river and the northern and eastern boundaries of the Shangani Native Reserve to the Shangani River; thence up this river to the northern boundary of Kenilworth Block; thence by and including Kenilworth Block, North Shangani Farm, Baltimore, Lynes Farm, Joseph Block, Bulawayo Syndicate Block, Mbati Tiabetsi Block, Shangani Reserve and Reserve, Battle Farm, Leechdale, Thornville, Dandasi, Ripley, Bon Accord, Liscard, Belmont, Forfar, De Beers Block and Torwood Lee; thence in a northerly direction along the northern boundary of Belingwe Reserve No. 1 to the Lundi River; thence down this river to a point where the old pioneer road crosses it; thence down this road to the Nuanetsi River, and down this river to the northern boundary of Wanezi Block; thence along the eastern and southern boundaries of this block and Jopempi Block to a point where it is crossed by the road from Mazunga to Messina; thence along the eastern boundary of this road to the Limpopo River.

HARTLEY—GATOOMA—BATTLEFIELDS.

An area bounded on the north by the Umfuli River from its junction with the Umniati River to its junction with the Doronanga River; on the east by and including the Mondoro Native Reserve and the British South Africa Company's Rhodesdale Ranche; on the south by and including the Rhodesdale Ranche; on the west by and including the Rhodesdale Ranche to the Sebakwe River; thence down that river to its junction with the Umniati River, and down that river to its junction with the Umfuli River.

VICTORIA.

From the junction of the Ngesi and Shasha Rivers up the latter river to the southern boundary of the Gurajena Native Reserve; thence along the southern boundaries of this reserve and the farms Drewton and Clarkdell to the Makoholi River; thence down this river to the south-west corner of the Nyamarundu Native Reserve, and along the southern boundaries of this reserve and the Zimutu Reserve to the Umyambi River, and down this river to the Popotekwe River; thence eastwards along the boundaries of the Victoria and Ndanga native districts to the Chishire River and up this river to its headwaters; thence in a straight line to Mount Bungu; thence along the north-western and western boundaries of the Makouri Native Reserve to the farm Allendale; thence by and including the farms Allendale, Cardigan, Glendhu, Iram, Vlakfontein, Niekerk's Rust, Iwade, Histonhurst, Arawe, Cheveden, Inyoni, Kelvingrove, Erichsthal, Oatlands, The Retreat, Morgenster, Mzero and Tentergate to the south-western beacon of the latter farm; thence in a north-westerly direction to a point on the Pioneer Column Road and southwards along this road to the Tokwe River; thence up this river and the Shasha River to the starting point.

MACHEKE STATION AREA.

An area including the native districts of Mrewa and Mtoko, and that portion of the native districts of Marandellas and Makoni bounded by and including the following farms:—Showers, Gongwe, Tiller, Highlands, Allen, Holton Estate, Reserve, White Gombola, Bonn, Calne, Wilton, Delta, The Cave, Mere, Naples, Machiki, Eldorado, Percyvale Estate, Monte Cassino, Fairfield Estate lying west of a line from the north beacon of Monte Cassino and the south-west beacon of Changwe Ranche No. 1, Changwe Ranche No. 1 and vacant land, and that portion of Weya Reserve lying west of the Nyagadzi River.

CENTRAL MAZOE AREA.

Starting from the south-west beacon of the Chiweshe and Negomo Reserve on Mount Ndiri; thence following the western and northern boundaries of this reserve to the south-west beacon of Lawley's Concession; thence eastward and southward along the Mazoe native district boundary to the south-east beacon of Batcombe; thence direct to the most northerly beacon of Ledbury; thence by and including the following properties:—Ledbury, vacant land, Benwell, Glen Douglas, Simoona Reserve, Leopaards Vlei, Gosforth, Jeta Reserve, Msana Reserve, Chikwakwa Reserve, Strathlorne, Saratoga, Bally Vaughan, Chindamora Reserve, Thelksinoi, Elpidha, Balkiza, Thetford, Spelonken, Arnold's, Smithfield, The Tatagura, Poort View and Camp Hill plots, Yarrowdale, Normandale, Summerdale and Moore's Concession, including all its sub-divisions, to the first-named point.

BROMLEY AREA, SALISBURY AND MARANDELLAS DISTRICTS.

An area bounded by and including the following farms:—Nyambuya, Waterford, Essexdale, Roraima, Peddie, Anwick, Hedon, Great Bromley Estate, Ardlussa, Wychwood, Glen Avon, Dunstan Estate, Dunedin, Banana Grove, Fordyce, The Glebe, James, Gardiner, Gilnockie, Retreat, Bellevue, Belmont, Belvedere, Rochester, Northfield and the Kunzwi Reserve.

NORTON-LYDIATE AREA, HARTLEY AND SALISBURY DISTRICTS.

Starting from the north-western beacon of the Gwebi Native Reserve; thence following the northern and eastern boundaries of this reserve, the northern and western boundaries of Herrenhausen and the western boundary of Riverside to the Hunyani River, up this river to the north-eastern beacon of Elladale; thence to the south-eastern beacon of this farm; thence along the northern and western boundaries of Suum Cuique to the north-eastern beacon of Arbroath; thence following the northern, western and southern boundaries of this farm, the southern boundary of Suum Cuique and the eastern boundary of Chisandtsa till the Hunyani River is again reached, and up this river to the north-eastern beacon of Tivoli Reserve, and along the eastern boundary of that reserve, the eastern and southern

boundaries of Gilston and the southern boundaries of Carnock and Ardno to the Ganga Native Reserve; thence south-westwards along the boundary of this reserve to the Umfuli River, and down this river to a point opposite to the south-eastern beacon of Fort Martin; thence to that beacon and along the eastern boundary of this farm to its most northern beacon; thence direct to the south-west beacon of Marsden; thence following the boundaries of the following farms which will include them: Marsden, Braeside, Jenkinstown, Ardmore, Makwiro Source, Pulham, Philiphaugh, Railway farm No. 29, Cressydale, Gwebi Junction and Eclipse Block to the first-named point.

Note.—These areas were declared under the following Government Notices:—Of 1915, Nos. 402 and 423; of 1916, Nos. 21, 22, 98, 126, 159, 208, 370, 373 and 460; of 1917, Nos. 42, 45, 65, 108, 201, 248, 278 and 283.

No. 202 of 1917.] [1st June, 1917.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 9 of the "Compulsory Dipping Ordinance, 1914," to suspend until further notice compulsory dipping of cattle, as provided for by Government Notice No. 201 of 1917, in the native district of Mtoko.

No. 200 of 1917.] [1st June, 1917.

COMPULSORY DIPPING OF CATTLE: SELUKWE NATIVE DISTRICT.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before the 3rd August, 1917.

Description of Area.

The Selukwe Native District.

No. 22 of 1917.] [19th January, 1917.

IMPORTATION OF CATTLE.

HIS Honour the Administrator has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notices Nos. 186 of 1914, 169 and 342 of 1916, and, notwithstanding any general restrictions on the importation of cattle, to make the following provision for the introduction of certain classes of cattle from the Cape Province, the Orange Free State and the Transvaal.

1. The following classes of cattle may be imported direct from farms or stock sales approved of by the Chief Inspector in the Cape Province, the Orange Free State or the Transvaal:—

(1) cattle with not more than two permanent central incisor teeth;
(2) cattle, irrespective of age, if entered in a South African Stud Book or appendix thereto, or cattle entered in a Stud Book which were originally imported from Great Britain or Ireland, the United States of America or the Kingdom of the Netherlands.

2. No importation as aforesaid shall be permitted until application for permission to import shall have been made, accompanied by a certificate in the form of the Annexure "A" or "B" as the case may be, and until a permit to import shall have been issued by the Chief Inspector, which may contain such conditions as shall from time to time appear expedient.

3. The importation of cattle from Great Britain and Ireland, the United States of America and the Kingdom of the Netherlands may be permitted under the following terms and conditions :—

(1) a permit shall be required from the Chief Inspector, which may contain such conditions as shall from time to time appear expedient;

(2) importations shall be through and direct from the ports of Cape town or Port Elizabeth.

4. All importations shall be by rail, and for the purposes of importation Bulawayo shall be the port of entry.

5. All cattle imported in terms of these regulations shall, on arrival at Bulawayo, Salisbury or Umtali, be submitted to such examination or tests as the Chief Inspector may direct. If such examination or tests disclose the existence of any destructive disease, the cattle shall be immediately destroyed and the carcases thereof disposed of in such a manner as a Government Veterinary Surgeon may authorise or require. The Chief Inspector may permit of the age restriction and the tests aforesaid being dispensed with in the case of cattle in transit by rail to any place beyond the borders of Southern Rhodesia.

6. All expenses or losses incident to quarantine, examination, testing or destruction as aforesaid shall be borne by the owner of the cattle.

7. Any person introducing cattle in contravention of these regulations or failing to comply with any of the conditions attached to permits to import, or furnishing applications, declarations or other necessary documents known to be false in any material particular, or failing to comply with all lawful directions as to quarantine, examination, testing, destruction or disposal of carcases, shall be liable to a fine not exceeding £20 for each animal in respect of which such offence shall have been committed, and in default of payment to imprisonment with or without hard labour for any period not exceeding six months, unless higher or greater penalties shall have been provided for such offences by the "Animals Diseases Consolidation Ordinance, 1904"; provided, however, that the penalties imposed by these regulations shall not exempt any cattle from destruction in terms of the aforesaid Ordinance.

Southern Rhodesia.

ANNEXURE "A."

IMPORTATION OF CATTLE

entered in a South African Stud Book or appendix thereto, or imported originally from Great Britain and Ireland, the United States of America and the Netherlands.

I,.....residing on the farm.....
in the district of.....in the Union of South Africa, do solemnly and sincerely declare that the.....(number in writing) animals enumerated below have been in my possession from.....(date), and that lung-sickness has not existed amongst any of my cattle since that date, and that none of such animals is prevented by any regulations or agreement in respect of freight from being exported from the Union of South Africa.

Description of Animals.

Breed.	Sex, name and number in Stud Book.	Country of origin.
.....		
.....		
.....		
.....		
.....		

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of.....
19.....before me,

.....
Resident Magistrate for the district of
.....

Names of former owners.....
.....
.....

Purchaser's name
Place in Southern Rhodesia to which animals are being sent.....

Southern Rhodesia.

ANNEXURE "B."

IMPORTATION OF CATTLE

other than cattle originally imported from overseas and cattle entered in a South African Stud Book.

I,.....residing on the farm.....
in the district of.....do solemnly and sincerely declare that the.....(number in writing) animals also enumerated below have been in my possession since birth, and that lung-sickness (contagious pleuro-pneumonia) has not existed amongst any of my cattle nor on my farm during the last four years, and that these animals have never been previously exposed for sale in any public market or stock fair.

Number of animals..... Bulls..... Heifers.....
Breed.....
Seller's name and address.....
.....
Purchaser's name.....
Place in Southern Rhodesia to which animals are being sent.....

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....day of.....
19.....before me,

.....
Resident Magistrate for the district of
.....

IMPORTATION OF STOCK FROM THE PROVINCE OF THE CAPE OF GOOD HOPE.

WITH reference to Departmental Notice of 12th July, 1913, it is hereby notified that the said Notice is cancelled, and that from date hereof permits may be issued for the importation of cattle into Southern Rhodesia from all parts of the Province of the Cape of Good Hope with the exception of the following districts :—

Komgha, Stutterheim, Cathcart, Maclear, Indwe sub-division of Wodehouse, Queenstown (Gwatyu Ward only), Glen Grey, Elliot Slang River.

30th March, 1917.

No. 364 of 1914.] [27th August, 1914.

REGULATIONS GOVERNING IMPORTATION OF LIVE STOCK, ETC.

UNDER and by virtue of the powers vested in me by the "Animals Diseases Consolidation Ordinance, 1904," as amended from time to time, I

do hereby cancel the regulations published under Government Notices Nos. 295 and 394 of 1908; 38, 61 and 263 of 1909; and 60 of 1911 and 188 of 1912, 47 of 1913, and so much of any other regulations as may be repugnant to or inconsistent with the subjoined regulations, which are hereby declared to be of full force and effect.

1. The importation of the following animals from the respective countries or districts enumerated is prohibited, owing to the existence or supposed existence of destructive diseases affecting the said animals in the said countries :—

(1) All animals and dogs as defined by the aforesaid Ordinance from—

India,
Mauritius,
Persia,
British Burmah,
Assam,
China and bordering countries, including Korea,
French Indo-China,
Dutch East Indies,
Hong-Kong,
Federal Malay States,
The Philippines,
Zanzibar,

and all other countries where surra is known or suspected to exist.

(2) Pigs from the Union of South Africa, the Bechuanaland Protectorate, the Tati Concession, and other countries in which swine fever exists or is suspected to exist, subject, however, to the exceptions contained in the proviso to this section.

(3) Dogs from the territories of Northern Rhodesia and Portuguese East Africa, subject, however, to the exceptions in the proviso of this section.

(4) Sheep and goats from the districts of Albany, Alexandria, Bathurst, Bedford, East London, Fort Beaufort, Humansdorp, Jansenville, Kingwilliamstown, Komgha, Peddie, Somerset East, Stockenstroom, Uitenhage and Victoria East, in the Cape Province; the districts of Barberton, Lydenburg, Marico, Pretoria, Rustenburg, Waterberg and Zoutpansberg, in the Transvaal; Swaziland, Portuguese East Africa, Northern Rhodesia.

Provided, however—

(a) that the Chief Inspector may at his discretion permit the importation of pigs, sheep and goats from the above-mentioned places on production of a certificate signed by a duly authorised Government Veterinary Officer in the form of Schedule "A" attached hereto;

(b) that the importation of dogs required for scientific purposes only may be permitted from the places mentioned in sub-section (3) hereof, by the Chief Inspector, in writing, subject to such conditions as may be imposed by him;

(c) that dogs, sheep, goats and pigs from countries from which importation is permitted may be introduced *via* the port of Beira, provided that all such animals shall be transferred directly after disembarkation to the railway trucks at Beira, and conveyed thence to Umtali without leaving the said trucks.

2. The areas set out in Schedule "B" hereto are hereby appointed for the depasturing and quarantining of animals for slaughter in connection with the places therein mentioned.

3. The several districts of Southern Rhodesia are hereby declared to be an area infected with scab amongst sheep and goats, and the movement of all sheep and goats from any farm to beyond the limits thereof, or from their usual grazing ground within the limits of any town lands or native reserves to any other place, is prohibited, except under the written permit

of an Inspector or Sub-Inspector. Such permit shall set forth the number and description of animals to be moved, the route they shall travel, and the period for which the permit shall be in force. In cases where it may be necessary or desirable, the person to whom such permit is issued may be required to cause the animals referred to therein to be dipped before being moved.

4. The introduction of sheep and goats is prohibited except—

(a) as specially provided for by section 1 hereof;

(b) from places not mentioned in section 1, if accompanied by a certificate in the form set out in Schedule "C" hereof.

5. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by rail shall immediately report such arrival to the Veterinary Office at Salisbury, Bulawayo and Umtali respectively, and no such animal shall be detrained at any intermediate station without the written authority of a Government Veterinary Surgeon.

6. The owner or person in charge of any horse, mule or donkey entering Southern Rhodesia by road shall immediately report such arrival at the Police Camp nearest to the place where such entry is made, and the officer in charge of such Police Camp shall immediately report to the Veterinary Department, which shall direct what steps are to be taken to test such animals with mallein, as in the following clause provided.

7. All horses, mules and donkeys, upon entering Southern Rhodesia, shall be tested with mallein, and the owner or person in charge of such animals shall in all respects carry out the lawful directions of the Inspector while such animals are being tested; provided that this regulation shall not apply to animals in transit through Southern Rhodesia which are not detrained *en route*.

8. Horses, mules and donkeys lawfully in this Territory, and required for purposes necessitating frequent crossing of the border, may be allowed to so cross on such terms as to registration, branding, testing and conditions as the Chief Veterinary Surgeon may from time to time deem expedient to prescribe.

9. An Inspector may direct the thorough cleansing and disinfecting of trucks which may be reasonably suspected of being sources of infection of any destructive disease, and may direct the destruction of truck fittings, fodder, excreta, or other matter or thing which may be reasonably calculated to convey such infection.

10. Any persons contravening the provisions of these regulations, or the instructions or directions given in terms of these regulations, shall be liable in respect of each offence to a penalty not exceeding twenty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding three months, unless where more or heavier penalties have by the aforesaid Ordinance, or by other regulations framed thereunder, been expressly provided.

SCHEDULE "A."

Certificate.

Issued under provisions of section 1, Government Notice No. 364 of 1914.

This is to certify that the animals enumerated below are, in my opinion, free from any destructive disease, including heartwater; and, to the best of my knowledge and belief, have not been in contact with any infected animals, nor come from, or through, a locality where any such disease is known to exist or has existed for twelve months from date hereof.

Date....., 19...

Place

.....

Signature of
Government Veterinary Surgeon.

Number and general description of animals :
.....Pigs, ...Sheep, ...Goats.

Place from which animals are to be sent :
.....

Owner's name and address :
.....
.....

Place in Southern Rhodesia to which it is desired to send the animals
.....

SCHEDULE "B."

Description of areas set apart for depasturing and quarantining of animals for slaughter.

Salisbury.—A fenced piece of land, 400 acres in extent, situated on the Makabusi River below Maggio's plot, within the Salisbury commonage and towards the southern boundary thereof.

Bulawayo.—That piece of fenced land situated on the Bulawayo commonage between the railway line, to the south, and the Solusi road, adjoining and to the south-west of the Government dipping tank, in extent 1,000 acres more or less.

Gwelo.—Starting from a point where the Ingwania road crosses the railway, along this road past the sanitary stables to a point a quarter of a mile west, thence in a line parallel with the railway to the Gwelo River, thence along the river to the commonage beacon No. 11, thence in a straight line to the Shamrock road where it is intersected by the Scout's Spruit, thence along the Shamrock road to where it joins the Main Street extension, thence along this to the railway line, and down this to the starting point.

Umtali.—A piece of fenced land situated on the old Darlington Farm section of the Umtali commonage.

Penhalonga.—A piece of fenced land situated on plot No. 2, Imbeza plots.

Selukwe.—A piece of fenced land, in extent about 300 acres, situated on the farm Sebanga and adjacent to the township of Selukwe.

SCHEDULE "C."

I, ... residing at
in the district of... in the.....
Colony, do solemnly and sincerely declare that the animals enumerated below are free from any contagious disease, including scab, and have not been in contact with any infected animals within six months from date hereof, and that, to the best of my knowledge and belief, such animals, in travelling to.....† station, will not come in contact with any animals amongst which scab or any other contagious disease exists.

And I make this solemn declaration conscientiously believing the same to be true.

.....

Declared to at.....on this.....
day of.....before me.

.....
Magistrate, Government Veterinary Surgeon, Scab Inspector, or Police Officer of district from which animals are being sent.

Number and general description of animals being sent.....
Owner's name and address.....
.....

Place in Southern Rhodesia to which animals are being sent.....

† Station within Colony of origin.

ISSUE OF PERMITS FOR THE REMOVAL OF STOCK.

IT is hereby notified for public information that His Honour the Administrator has approved of members of the British South Africa Police issuing permits for the removal of cattle, sheep and goats at the undermentioned stations when no Inspector or Sub-Inspector of Cattle is available :—

Nyamandhlovu.	Mphoeng's.
Gwanda.	Holi.
Plumtree.	Filabusi.
Fort Rixon.	Gwaai.
Belingwe.	Figtree.
Inyati.	Umvuma.
Fort Usher.	Que Que
Mazunga.	Tuli.
Makwiro.	Sinoia.
Banket Junction.	Buhera.
Makaha.	Beatrice Mine.
Sipolilo.	Wedza.

No. 23 of 1917.] [19th January, 1917.

HIS Honour the Administrator has been pleased, under the provisions of section 5, sub-section (1) of the "Animals Diseases Consolidation Ordinance, 1904," to approve of the appointment of the persons named in the subjoined list as Cattle Rangers for the district of Hartley for the purposes of examining cattle permits, detaining cattle being irregularly moved, detaining cattle infested with ticks and supervising the dipping of cattle in areas under the provisions of the "Compulsory Dipping Ordinance, 1914."

District.	Nominee.
Umsweswe	John William Banner, Umsweswe.
Eiffel Flats	Geoffrey Cotton Woodforde, Eiffel Flats.
Lydia	Reginald Heber Ullyett, Acorn Mine, Gatooma.
Golden Valley	John Mack, Golden Valley.
Shagari	Henry Fenwick Thompson, Shagari.
Umniati	Fred Morgan Linscott, Golden Valley.
Hartley Township	Dennis Handrick, Hartley.
Duchess Hill	Charles Edward Simpson, Concession Hill.
Gatooma—Hartley Road	Robert Appleton Sworder, Hartley.
South of Duchess Hill	William Muter Leggate, Hartley.
Old Hartley—Hartley Road	Frederick Percy Quinton, Hartley.

SUMMARY OF THE GAME LAWS.

Game is divided into three distinct classes, described as follows :—

(a) Birds and Small Buck.

(b) Bushbuck, Hartebeest, Impala, Lechwe, Pookoo, Roan and Sable Antelope, Sitatunga, Tsessebe, Waterbuck, and Wildebeest.

(c) Royal Game, which includes Eland, Elephant, Giraffe, Gemsbok, Hippopotamus, Inyala, Koodoo, Ostrich, Rhinoceros, Springbuck and Zebra.

The shooting season for Class "A" is as follows :—

In Mashonaland :

Birds from 1st May to 30th September.

Small Buck from 1st May to 31st October.

In Matabeleland :

Birds and Small Buck from 1st May to 31st October.

To shoot in Class "A" a licence costing £1 per annum is required. This entitles holders to hunt in both Provinces during the open season.

Class "B."—The season opens on 1st July and closes on 30th November in both Provinces. The licence fee is £25 for non-residents and £5 for persons having their domicile in Southern Rhodesia. This licence entitles the holder to shoot up to 15 head, which number may be increased to a total of 25 upon payment of a further sum of £15 in the one case and £5 in the other.

Class "C."—The Administrator may, if he is satisfied that the animals are actually required for scientific purposes, grant to the holder of a game licence permission to shoot or capture any of the species included in this Class. Such permit requires a £5 stamp. Applications in writing, together with proof of *bona-fides*, should be addressed to the Director of Agriculture.

Game for Farming Purposes.—Permits may be granted for the capture of Eland, Ostrich, Zebra or other animals for the purposes of breeding or farming. Such permits require a stamp of the value of £1 and remain in force for six months. Application, accompanied by a sworn declaration, should be made through the Director of Agriculture or the Civil Commissioner of the district.

Game Injuring Crops.—The occupier of any cultivated land or any person acting under the authority of such occupier, may at any time destroy game actually doing damage on such land.

Export of Game.—No living Game or the Eggs of any Game Birds may be exported beyond the limits of Southern Rhodesia without a written permit.

Shooting on Private Land.—A licence does not entitle the holder thereof to shoot on private land without the permission of the land-owner.

Farmers Shooting Game on their Farms.—By taking out a special £1 licence, farmers may at any time shoot any game on their land. "Game" does not include any birds, except ostriches.

Open Area.—The shooting or capturing of all classes of game with the exception of ostriches and other birds classified as game is permitted within the following area in the Hartley district until further notice :—

Hartley District.—From the railway bridge on the Umfuli River, thence north-westwards along the Umfuli River to where it joins the Umniati River, thence southwards along the Umniati River to where it joins the Umsweswe River, thence eastwards along the Umsweswe River up to the drift at the Lydia Mine, thence along the old road from Lydia Mine to Etna Mine and to Inez Mine, thence northwards along the road from Inez Mine to Hartley, thence in the direction of the railway bridge to the starting point on the Umfuli River.

The game specified may be shot in this area without a licence.

Protected Area.—All game is strictly preserved in the Urungwe Game Sanctuary as defined below :—

An area in the Lomagundi district, bounded as follows : On the north and west by the River Zambesi, starting at the point where the Lozenzi River joins the Zambesi, and following the course of the latter river to its junction with the Sanyati River; on the east by an imaginary line drawn from the junction of the Indurune and the Nyaodsa Rivers to the head-waters of the Lozenzi River, and thence along the course of the Lozenzi River to its junction with the Zambesi River; on the south by an imaginary line drawn due west from the point of junction of the Indurune and Nyaodsa to the Sanyati River, thence along the course of this river to where it enters the Zambesi.

Game in Class "A" may be hunted in the close season until further notice on private land in the Melsetter district by holders of a licence.

"Locust Birds" are strictly protected, *vide* Government Notice No. 390 of 1912.

Elephants on Occupied Farms, Melsetter.—The destruction of Elephants when found on occupied farms on the High Veld in Melsetter District is authorised (*vide* Government Notice No. 284 of 1908).

Trespassing on native reserves, in pursuit of game or otherwise, is prohibited, except with the written permission of the Chief Native Commissioner.

Trypanosomiasis.—Persons in search of game in the southern part of the Sebungwe district are warned of the danger of hunting anywhere west of the Sengwe and Lutope Rivers within the fly area, and especially of proceeding anywhere within the valley of the Busi River.

Ordinance No. 2, 1917.] [Promulgated 8th June, 1917.

An Ordinance further to amend the "Game Law Consolidation Ordinance, 1906."

BE it enacted by the Administrator of Southern Rhodesia, by and with the advice and consent of the Legislative Council thereof, as follows :—

1. (1) The "Game Law Amendment Ordinance, 1914," is hereby amended by the deletion of the words "or any European person duly authorised by such owner or holder" where they occur in section 1 of the said Ordinance.

(2) The term "occupier" in the said Ordinance shall include a manager or other representative of the owner residing upon the land of the owner.

2. This Ordinance may be cited for all purposes as the "Game Law Further Amendment Ordinance, 1917."

No. 249 of 1908.] [27th August, 1908.

PROTECTION OF TREES.

IT is hereby notified for public information that any person who shall cut down for use as fuel, or for any other purposes than *bona-fide* farming, mining or manufacturing purposes, or cause to be so cut down the "Wild Westeria" (native name M'Pakwa or M'poea) tree, will be liable to prosecution for contravention of the provisions of the Forest and Herbage Preservation Act, 1859, and upon conviction to a fine not exceeding £100, or to imprisonment with or without hard labour for a term not exceeding six months, or to such fine and imprisonment, or to such imprisonment without a fine.

No. 163 of 1909.] [29th July, 1909.

ANY person who shall cut down or destroy, or cause to be cut down or destroyed, the "Shuma" or "Mashuma" tree, except under written authority from the Estates Office of the British South Africa Company, and subject to such conditions as may be imposed therein, will be liable to prosecution for contravention of the "Forest and Herbage Act, 1859," and, upon conviction, to a fine not exceeding £100, or to imprisonment, with or without hard labour, for a term not exceeding six months, or to such fine or imprisonment, or to such imprisonment without fine.

No. 218 of 1917.] [15th June, 1917.

APPLICATIONS FOR USE OF WATER

in terms of Chapter I. of the "Water Ordinance, 1913."

IT is hereby notified that the following applications have been made, in terms of the "Water Ordinance, 1913," for authority to use water :—

Name of applicant.	From what river.	Native district of	For the purpose of irrigating a certain portion or portions of the
John Strachan - -	Mazoe and Little Mazoe	Mazoe	Farm Yarrowdale, and plots Willows, Lemon Pool and Mazoe Junction.
R. G. Garvin - -	Mazoe	,,	Farms Virginia and Sleamish
W. B. Colling - -	Garana-pudzi and Marodzi	,,	Farm Esperanza
W. J. Biggs - -	Garana-pudzi and Marodzi	,,	Farms Bellevue and Collingwood
J. Appleby - -	Yellow Jacket and Mazoe	,,	Farm Bloomfield
A. J. Doyle - -	Mazoe	,,	Farm Georgia
British South Africa Company	,,	,,	Farms Smithfield and Brundret
British South Africa Company	Tatagura	,,	Vacant land

Any person or persons whose rights may be affected thereby are hereby called upon, in terms of the regulations published under Government Notice No. 439 of 1915, to lodge, within three months from the date hereof, at the office of the Water Registrar, Salisbury, from whom further particulars are obtainable, their objections (if any) to the granting of these applications, together with a full statement of the grounds for such objections.

No. 250 of 1917.] [6th July, 1917.

ODZANI IRRIGATION AREA.

IT is hereby notified that, under and by virtue of the powers conferred on him by the "Water Ordinance, 1913," His Honour the Administrator has been pleased to constitute an irrigation board for the Odzani irrigation area, in the district of Umtali. Such board shall consist of five members.

No. 251 of 1917.] [6th July, 1917.

ODZANI IRRIGATION AREA.

IT is hereby notified that His Honour the Administrator has been pleased, in terms of the regulations published under Government Notice No. 459, of the 22nd December, 1916, to fix the following list of voters for the election of members of an irrigation board in respect of the Odzani irrigation area :—

Oswald Trevor Baker (executor testamentary, estate of late Oswald Baker).
Humphrey H. O. Bridgeman.
British South Africa Company.
Walter Henry Deall.
Rhys Seymour Fairbridge.
George Leonard Harrington.
John Lamport Stokes.

The election of members for the said board shall take place at Umtali on the 13th August, 1917, at the office of the Magistrate, who is hereby appointed Returning Officer.

No. 242 of 1917.] [29th June, 1917.

HERBAGE PRESERVATION ORDINANCE, 1913.

HIS Honour the Administrator has been pleased, in terms of section 6 of the "Herbage Preservation Ordinance, 1913," to declare that within the area described hereunder the provisions of the said section regarding the establishment of fire guards on the boundaries of farms shall be in force from date hereof.

The width of a fire guard within the said area shall be one of not less than fifteen feet on each side of the common boundary.

Description of Area.

That portion of the native district of Salisbury bounded by and including the farms Glen Avon, Brookmead, Inversnaid, Fordyce, Dana, Matopi, Woodleigh, Chitarra, Blue Water, Forres, Waterford, Hillside, Upton, Whiteside and Wychwood.

No. 243 of 1917.] [29th June, 1917.

FENCING ORDINANCE, 1904: INYATI AREA.

HIS Honour the Administrator in Council has been pleased, under the provisions of the "Fencing Ordinance, 1904," to define the area as described hereunder to be a district for the purposes of the said Ordinance, and in terms of sections 3 and 4 thereof to bring the provisions of Part I. of the said Ordinance into operation in the aforesaid district from date hereof.

Description of Area.

That portion of the native district of Bubi bounded by and including the farms Bletchingley Block, Scott's, Braemar Block, Wynslay Estate, Lortondale, Inyati Native Reserve, Fincham's, Riversbank, Robert Block, Shattil's Lease, Induna, Waterfall, Retreat, Felix and Umpuchene.

No. 261 of 1917.] [6th July, 1917.

HIS Honour the Administrator in Council has been pleased, under the powers vested in him by the "Fertilisers, Farm Foods, Seeds and Pests Remedies Ordinance, 1914," to cancel section 14 of Government Notice No. 421 of 1914, and Government Notice No. 9 of 1915, and to substitute the following in lieu thereof :—

"14. No person shall import or sell any fertiliser or farm food wholly or partially manufactured or derived from bone, such as bone meal, bone flour, bone dust, dissolved bones, bone compound or the like, unless such product shall have been sterilised by subjection either to—

(a) a dry heat of 140 deg. centigrade for not less than three hours; or

(b) a moist heat (under pressure) of 105 deg. centigrade for not less than 15 minutes.

"A declaration to this effect shall be furnished by the importer with the application for registration under Regulation No. 1, and further in any sale effected the seller shall furnish to the buyer the said declaration in addition to the invoice required by Regulations Nos. 6 and 7 hereunder.

"If at any time it shall subsequently appear that any person has made such declaration falsely, he shall be liable to the penalty provided for contravening these regulations."

No. 262 of 1917.] [6th July, 1917.

POUND AT BINDURA.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 5 of "The Pounds and Trespasses Ordinance, 1903," at the request of the Civil Commissioner, Salisbury, to declare and make known that the pound at Bindura, established by Government Notice No. 149 of 1913, is hereby abolished, and that a pound has been established on the farm Kippendale, near Bindura, in the magisterial district of Salisbury, and that the said pound shall be available for the public from date hereof.

No. 263 of 1917.] [6th July, 1917.

ESTABLISHMENT OF A POUND AT CHIPINGA.

HIS Honour the Administrator has been pleased, under the provisions of section 5 of "The Pounds and Trespasses Ordinance, 1903," at the request of the Civil Commissioner, Melsetter, to declare and make known that a pound has been established on the farm Old Town Lands at Chipinga, in the magisterial district of Melsetter, and that the said pound shall be available for the public from date hereof.

Department of Posts and Telegraphs,

Southern Rhodesia.

POSTAL NOTICE No. 23 OF 1917.

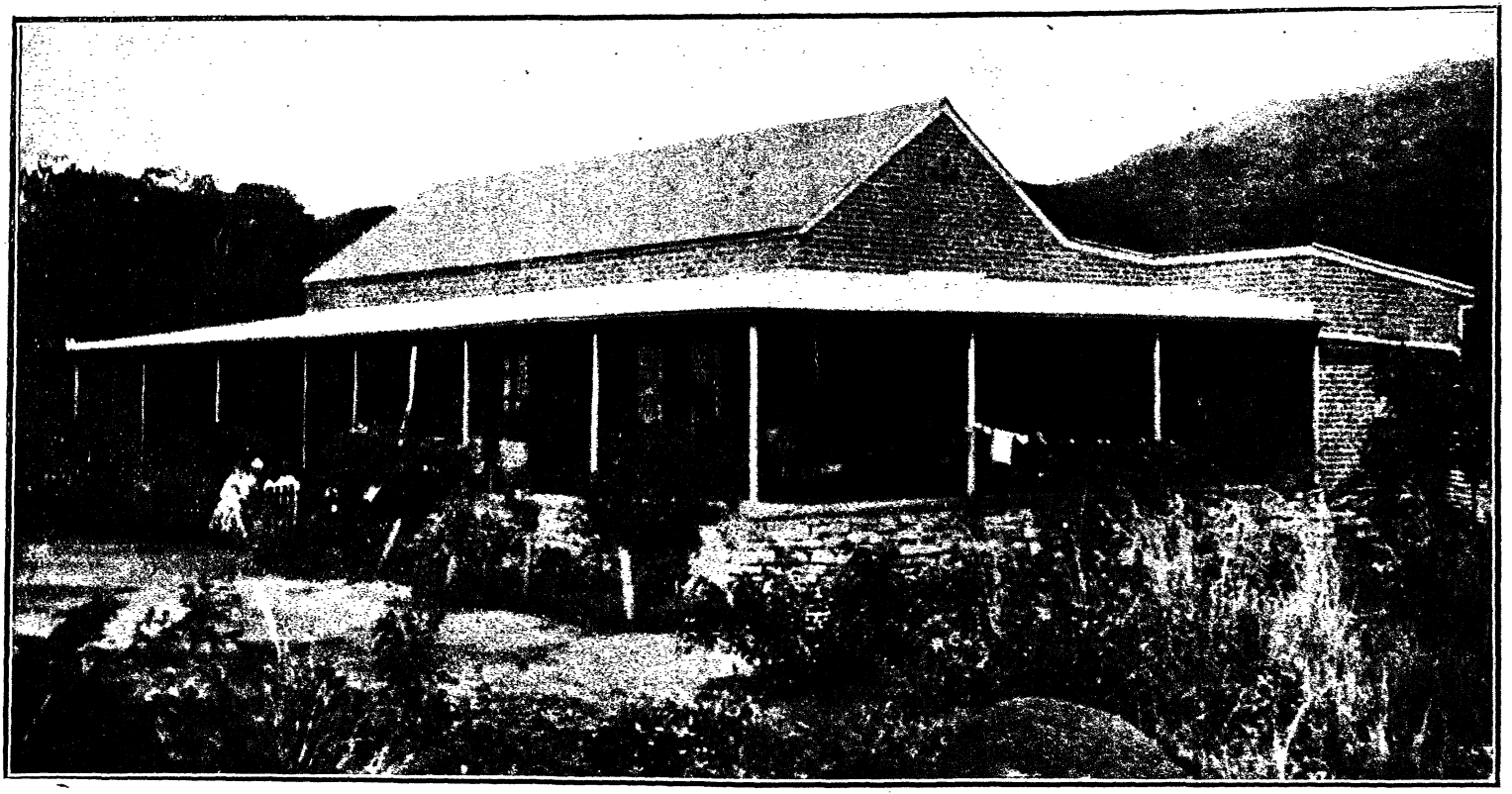
EXPORT OF NAPIER FODDER GRASS PLANTS AND ROOTS.

IT is hereby notified for public information that the Government of the Bechuanaland Protectorate has decided to permit the introduction into the Protectorate from Southern Rhodesia of Napier fodder grass roots and plants on condition that they are accompanied by a certificate, signed by a veterinary officer of the Rhodesian Administration, to the effect that they have come from an area free from African Coast Fever. The necessary certificates will be issued only from the office of the Chief Veterinary Surgeon in Salisbury, without charge.

No parcel or packet containing Napier fodder grass roots will be accepted for transmission by post to the Bechuanaland Protectorate unless accompanied by the required certificate.

G. H. EYRE,
Postmaster General.

General Post Office,
Salisbury, 30th May, 1917.



Homestead of Mr. R. H. Wood, Exeter Farm, Mrewa.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—NO. 5.] OCTOBER, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

ALTERATIONS IN JOURNAL.—Our readers will notice some differences between the present issue of the *Journal* and its predecessors. As a result of the war, the price of paper has advanced several hundred per cent. above pre-war costs, and the position has arisen that the Government had to decide whether publication of the *Rhodesia Agricultural Journal* should be continued or not. It is believed that the *Journal* fulfils a useful purpose and is valued by the farmers, and therefore that every effort should be made to prevent any break in the continuity of the publication. The difficulty has been overcome by the introduction of certain modifications in the arrangement of the *Journal*, which will be seen in the present issue. The quality of the paper remains as before, but a smaller type has been used to economise space,

and the continued reproduction of all Government and Departmental Notices affecting farmers has been abandoned for the time being. New notices and amendments of old notices will appear as usual. There are also other minor modifications in the general style and appearance, and some reduction in the bulk of the *Journal*. We believe readers will appreciate the reasons of economy which compel us to make the changes referred to during war times.

THE RHODESIA MEAT PACKING CO.—As will have been gathered from the Press reports, the Rhodesia Meat Packing Co. has been successfully floated, and Odzi has been chosen as the site for the factory. This event marks a vitally important step forward in the history of the cattle industry in Rhodesia. In congratulating the promoters and in wishing them success, we feel that we are voicing the sentiments of every cattle-owner in Rhodesia and of all others who are interested in the progress of the country.

The collection of the information on which the action of the promoters is based has necessitated a long and careful enquiry, and we have no doubt that what may have seemed to some to be a tedious wait will prove in the end to have been a wiser course than any hasty procedure insufficiently supported by reliable data. We look forward hopefully to a time in the near future when that *bête noir* of the rancher, "the old cow," will find a last resting place more useful than the mud hole, and, together with superior animals, will be profitably utilised by the canning factory.

EXPORT OF CATTLE TO THE UNION.—The intimation that the Union Government, as the outcome of representations made to them by His Honour the Administrator, have now consented to extend, under certain conditions, the facilities already granted for the export of cattle from Southern Rhodesia to the abattoir markets of Johannesburg and Pretoria, will no doubt be hailed with much satisfaction by our stock raisers.

Matabeleland has benefited most markedly from the opportunities it has enjoyed of exporting cattle to the south, and has, since export began in May, 1916, sent over 20,000 head of cattle away. The market, however, can absorb very much more cattle than Matabeleland can supply, and in this connection it is to be noted that slaughter stock have recently been admitted to Johannesburg from (German) South-West Africa. Those farmers who have in the past enjoyed these advantages will, therefore, not grudge to their fellow farmers access to this market, where there is ample room for all.

Hitherto, to comply with the stipulations of the Union veterinary authorities, it has been necessary for us in Rhodesia to guard against cattle from Mashonaland, and even from Gwelo and Selukwe districts, passing into the Union *via* Bulawayo. Now the only stipulation imposed by the Union Government is that cattle from Mashonaland shall remain for a period of two months in Matabeleland before being exported. This is apparently enforced as an extreme precaution, and to

satisfy possible objections by breeders in the Union, where the erroneous idea is prevalent that diseases of stock are rife in Mashonaland. This restriction of two months in Matabeleland is really no great hardship, since, owing to the length of the journey from the more remote parts of the country, a break before proceeding on the final long run to the south is quite essential for the cattle. Experience shews that a brief interval for feeding and watering is of no avail. Cattle take much longer than a few hours to recover from the shock of the journey, and the process of re-trucking them immediately entails considerable cruelty and disturbance to the animals, which prevent their benefiting by the opportunity for feeding and watering. An enforced rest of two months will, however, enable the stock to recover their weight, and possibly even to improve it on the sweet veld of Matabeleland.

The system insisted upon by the Union may restrict direct sales. The owners of large mobs may find it worth while to hire grazing for the two months, whilst others will no doubt sell at their most convenient market to buyers from Matabeleland or the Union who can make their own arrangements.

The facilities now given can in practice only apply to veld-fed stock, and it must be admitted that the stipulations made preclude the sale from Mashonaland to the Union of stall-fed cattle, which are, of course, the best and the most suitable for the overseas trade. We may look forward, however, to some day overcoming this difficulty also.

The export of cows in calf or with calves at foot is prohibited.

This outlet for our slaughter stock to the south ought not to interfere with the trade of the canning factory when it is ready to commence operations, because the typical canner cannot satisfy the requirements of the Union for prime meat. As the shareholders of the factory are almost entirely cattle-owners, the rise in price of stock which may be expected to result from this opening up of new markets can only benefit them and the trade in general.

It is recognised that for some years past farmers have been carrying large stocks of matured cattle, unsaleable for lack of a market, and this new outlet, besides giving immediate relief in this direction, unquestionably materially encourages the stock breeding industry in all parts of the country.

For the information of those who have not hitherto been interested, but are now able to export slaughter stock, it may be added that permits for such export must be obtained from the Veterinary Department, and that cattle are exported only in sealed trucks, unaccompanied by any hay, forage or grass, and that they must be free of ticks. In no circumstances are any cattle that arrive at Johannesburg or Pretoria from Rhodesia permitted to remain alive, but proceed directly from the truck to the abattoirs.

Soil Erosion.—The Water Court, which recently concluded a partial investigation of the hydrographic conditions of the Mazoe Valley, in its report to the Government has drawn attention to the growing evil of soil erosion, and to the urgent need for preventive

measures before it becomes still more serious. The fact that this injurious process is always steadily at work, and that the scope of its action is being increased every year, has long been recognised by the Government and by all residents who have given the matter any consideration. The discovery, however, of preventive measures which would be both effective and applicable in practice presents a problem of great difficulty. The Government has under consideration a proposal to legislate in the desired direction, and we write on the subject now because it is hoped to secure the co-operation of farmers' associations, miners' associations and individual farmers and others in an effort to meet and combat the danger as quickly as possible, and before irreparable damage has been done to the country. The acceleration of soil erosion when a territory is occupied by farmers and miners is generally ascribed to one or all of the following causes, and what we now seek is advice and suggestions as to how the mischief can be prevented or minimised.

(1) The destruction of trees. Can this be limited by legislation, or can its effect be counterbalanced by compulsory afforestation?

(2) The burning of grass and other herbage. Can methods, other than those now in force, be suggested for a still better control of grass burning?

(3) Methods of cultivation, such as carelessness in drawing plough furrows down steep slopes and the draining of vleis and valley bottoms. Is it possible to devise a system by which valleys and slopes may be cultivated without danger of washing and sluiting?

(4) Over-stocking of land and the herding of sheep and cattle, resulting in the undue denudation of the veld and the formation of cattle tracks, which later develop into dongas. It is known that the second of these evils may be overcome and the first to some extent reduced by the division of pasture land into a series of paddocks to be grazed in rotation, but is this a matter in which Government action is possible, or must the remedy wait until stock-owners are educated up to the necessity of protecting themselves, or until they are financially able to provide the required paddocks?

(5) The construction of roads and railways, which, by their embankments, culverts and drains, tend to concentrate into narrow channels waters that previously flowed over wide areas and now by such works cause the formation of sluits. These difficulties cannot be entirely eliminated unless we do away with roads and railways, but they can be partly overcome by improved methods of constructing culverts and drains, so that the water discharged from them may be spread as widely as possible over the lands below.

We desire to draw the attention of all landowners to the importance of this question, to the urgent need of applying remedial measures, and at the same time to solicit advice and suggestions as to the best way of meeting and checking a growing evil.

An article on the general subject of soil erosion was published some years ago in this *Journal*, and copies of same in bulletin form can be obtained on application to the Agricultural Department, Salisbury.

THE ENKELDOORN PRODUCE EXPRESS.—We publish in this issue the rules and regulations of the Enkeldoorn Produce Express Syndicate, and we would draw attention to the very great benefit that a regular transport service of this kind is to farmers living at a distance from rail. In its initial stages the Syndicate owed much to the work of Mr. Brocklehurst and to its energetic first secretary, Mr. Loynes, both of whom are now serving their country in Europe. When these two gentlemen relinquished the work, some difficulty was anticipated and indeed realised. The Rev. Mr. Liebenberg, however, came forward, and, with the energetic and business-like assistance of some of his more firmly established neighbours, the good work begun by Messrs. Brocklehurst and Loynes has been continued and developed.

From the commencement two wagons, each capable of carrying 4,000 lbs. or 5,000 lbs., have been used. Originally all oxen were hired from the members, but as the scheme developed it was decided to raise the necessary capital to purchase the oxen right out, and to put things on a proper business footing. Under ordinary co-operative rules the property of a society belongs jointly to all the members, all share on a *pro rata* basis in profits, and they are all jointly and severally responsible for the liabilities of the society. In a community in which only a small number are men of means and the majority are not in a position to take up any appreciable financial liability, the failure of such a co-operative society may mean that the few wealthy men are forced to meet the liabilities which properly should be shared *pro rata* by the whole society. This aspect of the question has in some districts deterred the inhabitants from co-operating. In Enkeldoorn the difficulty has been overcome by certain men forming a syndicate for which they are solely responsible financially as foundation members, but in which they allow their neighbours to share in the benefits as ordinary members equally with themselves, except in regard to profits, although all the liability they have to take up is the entrance fee of £4 4s. They have even, we notice, given the ordinary members representative and administrative powers equal to those of the foundation members. This broad-minded and generous action has resulted in securing the active co-operation of practically the whole district. It has improved the position of those who were less well to do, and in all probability many of them who are now only ordinary members will eventually avail themselves of the opportunity of becoming foundation members, and will take their share of the responsibility. True co-operation is based on the goodwill towards one another of those co-operating. In the case under review, this principle appears to have been fully recognised, and the trust has been justified.

The Syndicate was formed and commenced operations on 1st November, 1915, and has been a marked success, and proved a great boon to the farming district between Umvuma and Ngezi Farm, giving twice-weekly service along the whole route of fully 80 miles. The rules adopted at its initiation had ceased to be applicable, and at the last meeting they were referred to a committee to be revised. This has been done with great care, and it is thought these rules might be found

useful to other groups of farmers who would benefit by a similar regular and reliable means of communication with the railway or direct to their market town.

Gwebi Crops.—The first part of the annual report on the work on the Gwebi experiment farm appears in this *Journal*, and the second part will be published in December. The operations at Gwebi are growing in magnitude and complexity every year, and the labour and patience involved in their execution is not fully indicated by the statement that 475 acres of land were under crops, divided into 250 distinct plots, nor even when it is said that 34 different crops were handled. A private individual might accomplish all this if he had the capital and were gifted with power of organisation. The difficulty of carrying through work of the kind attempted at Gwebi lies in the necessity for precise accuracy, and the value of the experiments depends entirely on the attainment of this accuracy. This implies careful measurement of every division of land and exact weighing of every product, in order that the results obtained may be perfectly reliable for the guidance of farmers. Further, every step must be recorded in a concise manner and results co-ordinated with the work of previous years, and the whole reported, simply explained and deductions drawn for the benefit of the farmers. We believe that the value of the Gwebi farm experiments is appreciated by most of our readers, but there may be some who hardly realise the nature of the work, or the way in which it differs from the work of an ordinary farm.

Broom Corn.—Since we wrote on this subject in August, we have received further reports from broom manufacturers in the Union, who are well pleased with samples from Rhodesia, and enquire for supplies both immediately and next season. Competent authorities report that sample brooms made in Rhodesia, sent to them by the Agricultural Department, are very well made. The Union manufacturers are now anxious to obtain supplies from this country, and mention prices even better than those quoted in our August number and up to £30 and £35 per ton. We, therefore, have every confidence in recommending farmers to plant broom during the coming season, for a market at good prices is now a certainty, and the possibility of growing an excellent quality of the raw material in Rhodesia has been amply proved over a number of years. The manufacture of brooms is still carried on in Rhodesia on a small scale, and it is to be hoped that the local makers will be encouraged to enlarge their plant and so keep the industry in Rhodesia.

Broom corn will do well on land suitable for maize or ordinary kaffir corn. It should be planted in rows 3 feet to 3 feet 6 inches apart, and the plants in the rows from 9 inches to 12 inches distant from one another. Cultivation as for maize. Further particulars as to culture, harvesting, grading, packing and marketing may be obtained from the Agricultural Department, Salisbury.

OBITUARY NOTICES.—It is with deep regret we again have to place on record the death of former members of the staff.

On 1st August Lieut. N. H. A. Ready died from wounds received in action on the western front while in charge of a tank. Mr. Ready held the post of cattle inspector in the Veterinary Department from April, 1912, to June, 1916, when he volunteered for the service of his country, and has now made the great sacrifice.

On 16th August Mr. Harry Comaroff, who was a clerk in the Department of Agriculture from December, 1914, to July, 1916, died of blackwater fever in East Africa, whither he had gone at the call of duty.

They died for freedom and honour.

Rhodesian Quarter-Evil.

By A. STEWART RICHARDSON.

The following notes on Rhodesian quarter-evil, resulting from observations taken in treating a herd of over 4,000 head, may be of interest to local farmers, though coming so soon after the able and authoritative articles written by Mr. S. B. Woolatt, F.R.C.V.S., and by Mr. Edmonds, M.R.C.V.S., in the *Farmers' Weekly* and the *Rhodesia Agricultural Journal* respectively, they may, with good reason, be deemed somewhat superfluous. Many of the conclusions arrived at by the writer must be taken as being tentative only, for it is certain that the experiences of those whose herds have been attacked have varied greatly, both as regards the severity of the disease, the ages of the animals shewn to be susceptible, and the effects of inoculation, and it is quite probable that many of the opinions herein set down will have to be revised when further information regarding the disease has been collected locally. Such information appears to be urgently wanted, in view of the fact that quarter-evil has cost the country several thousand head of cattle, and may be with us, off and on, during the rest of our history.

There is no doubt that isolated cases of the disease have been occurring with some frequency throughout the country for years past. In its present epidemic form, however, the disease appears to have reached Rhodesia (or to have been first recorded—by no means the same thing) about December last. The means whereby the disease has spread

from the Plumtree district right over the heart of Matabeleland has been the subject of a good deal of argument, mostly, as usual, based on unproved assumptions. One of the commonest of these is that the disease has followed the line of the late rains, which therefore must be held to be the predisposing cause. This argument appears to be fallacious, for the weather conditions in the Plumtree district in December, 1916 (midsummer), and those prevailing in, say, the Bubi district in July, 1917 (midwinter), can have very little in common.

It is held by many, possibly by the majority, that quarter-evil is not infectious in the sense that, *e.g.*, lungsickness is. But if quarter-evil is not infectious, it is difficult to account for its orderly and continuous progress from farm to farm. I understand that in parts of Europe quarter-evil is held to be infectious, and is therefore a notifiable disease, and if this is so, there would appear to be good grounds for our at least considering methods to check the evil based on the assumption that it may be infectious. It is certainly not sporadic in the usual sense. The opinion on this point arrived at by the writer, without of course his having any scientific authority or knowledge on which to base his argument, is as follows:—

It seems to be certain that the germs of quarter-evil exist practically everywhere throughout Matabeleland, but normally only very occasionally give rise to any losses, and then only to a trifling extent. But it is at least possible that, as I understand sometimes happens in other diseases, some other germ carried along the ordinary channels of infection may be the predisposing cause whereby the quarter-evil germ is awakened to activity, in much the same way as the gall-sickness microbe only gets its chance when its host's vitality has been reduced by a previous invasion by the redwater germ. It is just possible that some highly infectious microbe, in itself practically harmless, and possibly ultra-microscopic, gets carried from farm to farm, and by its action on its host allows the ever-present quarter-evil microbe to become active. I merely put this forward, with the greatest diffidence, as a possible explanation of the recent occurrences. In addition to the above supposed means whereby quarter-evil may be spread, there is the assured risk of infection from undestroyed carcases. Meat and hides can be carried long distances by natives, or sold by unscrupulous or ignorant Europeans, while vultures and jackals and kaffir dogs can undoubtedly infect large tracts of country if allowed access to dead cattle.

On the foregoing lines of reasoning, therefore, a fair case might be made out for treating quarter-evil as a notifiable disease, for the stopping of all movement of cattle in an infected area, and the strict quarantining of infected farms. Personally, I am strongly in favour of such a course being taken. Had quarter-evil been made a notifiable disease from the start, dozens of ranchers and farmers would have been made aware that a great danger was slowly approaching them. As it is, the majority of sufferers have been taken completely by surprise. When prompt action as regards the treatment to be adopted was a vital necessity, cattle-owners only woke up and began to ask, "Shall I inoculate or not?" when the disease was on the next farm or

had actually broken out on his own place. If he decided to inoculate (and he had absolutely nothing to help him in making up his mind on this point) he found that the proper kind of syringe was unobtainable, and that he was confronted with a further problem in the shape of whether to use single vaccine or double. In short, because quarter-evil had existed in epidemic form in Rhodesia for seven or eight months without having been made notifiable, the experience that might have been gained over that valuable period was lost, and no records as to treatment and its results were available to the public. The wrong kind of syringes and unsuitable vaccines were hastily got together and often wrongly used, and *I believe that more than half the mortality that has occurred, both before and after inoculation* (and it is much greater than most people imagine), *is directly traceable to these easily preventable sources*, and to the extraordinary silence that was maintained for eight months by sufferers from the disease, and by the Press. With compulsory notification, wide publicity as to the progress of the disease, and careful study of its local forms by competent specialists (of whom we have several)—the conclusions derived from such study to be regularly disseminated among all cattle-owners—the results of the present epidemic might have been vastly minimised, and large tracts of country saved from new and lasting infection.

The next point of importance is the treatment of the disease. Cattle-owners appear to have four methods of safeguarding their herds, each of which methods has its champions. The first is simply to move one's cattle away from the spots where the infection appears to have originated. The second is to chivvy the cattle about from pillar to post on the assumption that they will thereby lose in condition, and therefore be safe from a disease which appears to specialise in fat animals. The third is to setonise, and the fourth is to inoculate.

Taking the first method, moving one's cattle, much seems to depend on how one is situated. It is logical to move cattle away from any spot where animals have died, especially if it has been found impossible to burn or properly bury the carcases; or to move as far as possible away from the boundary of a neighbour who has the disease. But I believe that the success which has undoubtedly occasionally attended such simple treatment is due more to the fact that the cattle thereby escape the new and gross infection spread by dead animals, rather than to the theory that the disease is lying about in certain well-defined patches of veld. If one has a small herd and plenty of room, one might with luck be able to dodge the disease for quite a long time, but there appears to be little real safety in such a method alone. If taken in conjunction with inoculation, it has, in the writer's opinion, everything to recommend it.

The second method of making one's cattle lose in condition, is, as a rule, hardly necessary in Rhodesia in midwinter, and a little later on in the season the remedy might be found to be worse than the disease. Further, while it is undoubtedly a fact that the disease appears to have an affinity for cattle in high condition, it by no means follows that thin stock will be spared, and from personal observation it is certain that the Rhodesian form of the disease will attack the

fat and the lean, the old and the young, though about 80 per cent. (in the writer's experience) of cases occur in young fat cattle.

The third protective idea, setonising, is probably the oldest of all the methods of preventing quarter-evil. To setonise properly, that is to insert a medicated cord through the dewlap without injuring the underlying membrane, would be a more tedious business with a really large herd than inoculating. Whether or not it has any protective value the writer cannot say, but he has seen a few and heard of many animals all duly setonised in the usual South African rough and ready method which have died of quarter-evil. That may have been due to the setonising having been improperly performed, but the best opinion appears to be against this practice as inefficient.

That brings one to inoculation, a method which is modern, and due to scientific research, and has the approval of the highest veterinary authorities. There is little doubt that inoculation, properly performed with suitable instruments, fresh vaccine of a suitable type, and with due regard to surgical cleanliness, is the only method of preventing or treating the disease worthy of a moment's consideration. There appears to be a good deal of prejudice against inoculating until the disease has actually made its appearance in one's herd. The writer has tried inoculation both before and after the disease has appeared, with the following results:—

Herd "A," 2,100 head.—*Inoculation performed after the disease had appeared.* (It should be noted that this inoculation was carried out with a faulty type of syringe, and with both single and double vaccine, which to a certain extent detracts from the reliability of the deductions drawn.) All animals old and young inoculated, the infection being very strong. *Result*—110 losses in six weeks, and much illness.

Herd "B," 750 head.—*Inoculation carried out when the disease was ten miles away.* An improved syringe (though a far from good one) was used, *also good single vaccine. Result*—One death only.

Herd "C," 1,250 head.—*Inoculation carried out when the disease was still far away.* Syringe and vaccine same as for herd "B." *Result*—No deaths, and no apparent sickness.

From the foregoing experiences, I have no doubt whatever that as soon as the cattle-owner sees the disease approaching he should inoculate forthwith all his younger cattle at least. Hence the need for early and reliable reports as to the spread and virulence of quarter-evil.

From actual experience, based on having made over 5,000 inoculations, I would advise those who intend to inoculate to discard the usual syringes with leather washers and plungers. Sterilisation of syringes in boiling water is an essential part of the inoculating process, and it will be found that no leather will stand this treatment. It perishes or goes soft, with the result that the syringe leaks everywhere. If any block occurs in the needle (and the quarter-evil vaccine is specially liable to cause this), the leather plunger will allow the vaccine to pass back behind it, resulting in an animal not receiving a sufficiently large dose to protect it. Again, every care should be taken to prevent

the injection of an air bubble, which is almost invariably drawn into the syringe when charging it, and which is extremely dangerous. I got this tip from Mr. G. W. Pott, who has had a lot of experience inoculating for anthrax in Northern Rhodesia. The best plan is to mix (say) three tubes of vaccine all together in one receptacle, then draw up the first ten doses into the syringe, and after injecting nine doses, express the last dose along with the air bubble back into the receptacle. By far the best syringe I have seen was one in the possession of Mr. Bradshaw, of Trevelloe. This syringe has all-metal parts. The plunger and piston are in one, and of the same diameter right along, and it has most convenient finger-grips. This syringe is by Messrs. Park, Davis & Co., of London, patent No. 880433, capacity 10 c.c., and I consider every stock-owner ought to have one—*and plenty of spare needles.*

The next point is what vaccine to use. I have found that *the single injection vaccine, put up in tubes with a red ring, effects not only a great saving of time and labour, but is absolutely efficient and stops the disease,* though there may be many cases of sickness after its use if the disease has gained a hold prior to inoculation. The double vaccine, put up in clear tubes (No. 1), and in tubes with a black ring (No. 2), means that eight days after the first inoculation the same animals have to be re-inoculated. Now, with a dairy herd, or a small herd of a hundred head or so, that does not matter much, except for the delay in *obtaining full protection,* which may cost you a number of head. But for a larger stock-owner it complicates matters. Possibly the latter may find that before completing the first inoculation of his herd it is time to begin the second inoculation of those done first. Again, without a system of special marks, one cannot be certain that the cattle done on (say) the first of the month are brought up for the second inoculation on the ninth, and so on, while in any case a great deal of unnecessary handling and cutting out is involved. But I principally object to the use of double vaccine because I found that the first inoculation was not sufficiently strong to protect animals from acquiring the disease during the eight days between the first and the second inoculations, to which have to be added the two or three extra days while the vaccine is getting to work. Stock-owners should insist on *single, red tube vaccine,* and see that they get it.

A point that occurs to one is this. The Rhodesian form of the disease seems to differ somewhat from that in the Union. Would it not, therefore, be better to have the vaccine for treating Rhodesian animals made at the Salisbury laboratory from local animals, instead of going hat in hand to the Union for supplies, and getting whatever is given us?

In handling large numbers of cattle, many of them the half wild animals one finds among ranching stock running free day and night in large paddocks, I have found the use of the "cattle-squeezer," introduced into Rhodesia from America by Mr. Fleming, of the B.S.A. Co.'s ranches, of the very greatest help. Even in the case of some hundreds of cows heavy in calf, the squeezer has been used by myself without any loss or injury, though the use of stuffed sacks as padding fore

and aft no doubt helped greatly. The squeezer is not only humane and saves the cattle a lot, it also saves the stockman from many unnecessary kicks and hornings. It is a simple matter for a wild heifer to kick half a man's face off when she feels the prick of the needle. The squeezer prevents most of that, and can be used with animals of all ages except quite young calves, which, however, are easily handled without it. Two hundred and fifty head of wild cattle have been rounded up, caught and inoculated with one syringe only in the course of a day by this means, and I do not believe that more cattle than the above number can be done in one day if due care is taken in the operation. One point to be impressed on owners is this: Never castrate if the disease is present, or if you are inoculating. If you do, the disease will settle in the wound and kill the calf in a few hours.

The forms taken by the disease in Rhodesia are many. The commonest form is, of course, familiar to most people, viz., sudden lameness, followed by a swelling in either fore or hind quarter, and death in a few hours, with the characteristic crackling sound in the swelling if one applies pressure there. It is easily understood that probably for many years past isolated cases of quarter-evil have been attributed to snake bite. But many cases occur when there are no visible swellings, and no lameness. Sometimes the animal is affected in all four quarters at once, and with smaller swellings in loin and neck, sometimes in the loin only, or in the neck or head. One or two cases I observed got the swellings in the tongue and jaw, and some of these recovered. The most deceptive cases are those in which there are no outward symptoms, except perhaps great intestinal swelling, in which case there is a natural tendency to attribute the loss to hoven and not to quarter-evil. Several owners have deceived themselves in this way until other unmistakable cases have occurred.

All ages of cattle appear to be attacked by quarter-evil in Rhodesia, and this has led to the frequently expressed opinion that the virulency of the disease is much greater in Rhodesia than further south. Though to the writer's knowledge the disease has killed calves of three months old, weaners, heifers in calf, cows in calf and with calves at foot and even trek oxen five years old, there is no doubt that 80 per cent. of cases will occur among cattle ranging from six months to eighteen months. My own experience is that calves of six and seven months old were principally attacked, but that may be because all the young weaned stock were promptly inoculated first of all as being probably the most susceptible, and that with good single vaccine. Three females were killed by the disease to one male—probably a mere chance result, which may be reversed on other ranches. No bulls at all died, old or young, and no Africanders or graded native cattle. The disease picked out so-called "improved" or "well-bred" calves, true to type, and in the very pink of condition. A number, probably ten or a dozen, grown animals which got the disease before being inoculated, and shewed lameness, etc., recovered without any treatment, and shewed no distress to speak of. After inoculation, especially with the double vaccine, a large number of cattle got the disease either as the result of inoculation or because the "clear-tube" vaccine was not strong enough

to give them protection. Any animal (with one exception) that survived after being attacked for more than 48 hours invariably recovered, but these recoveries were confined to animals over eighteen months. Any calf that shewed the symptoms died, occasionally with great rapidity. I have seen a calf come up to the yards at 7 a.m. playing about round its mother. At 9 a.m. it was lame, and at midday dead.

Another case, the exception referred to above, was that of a young cow. She lay down and had to be fed. Her appetite was good for a week, and the only thing wrong with her that one could see were two small round swellings behind the eyes, and a foul nose and mouth, along with purging. Her appetite failed after a week, the swellings behind the eyes disappeared, but a new and enormous soft swelling of a dropsical type grew beneath the jaw, and she died three days after.

A month after inoculation several animals (grown cows) developed symptoms resembling stiff sickness (both on this and other ranches), but there have been no fatal results so far so long as the animal is fed and watered, its general health and appetite appearing to be good, though one or more legs are stiff and useless, and there is a rapid decline in condition.

This disease has taken so many forms that a number of owners have seriously considered whether or not the quarter-evil may not be associated with another or more than one disease. Anthrax may always be suspected, and it would have relieved many of us of much additional worry if the Veterinary Department could have sometimes sent out a qualified expert to follow the progress of the disease, and to diagnose obscure cases.

The disposal of carcases of cattle that have died from quarter-evil is of the utmost importance, for accordingly as this is done properly and thoroughly, or carelessly or not at all, so will the mildness or the severity of future attacks be. The man who from laziness will neither burn nor bury, and the degenerate irresponsible who skins dead cattle and sells the hides, are both criminals who should have no mercy shewn them. If a man has no wood on his farm, and not enough labour properly to bury his dead cattle, it should be made possible that by applying to the nearest magistrate a sufficient supply of natives be sent forthwith to conduct all such work. The best plan, wherever possible, is to burn the carcase to ashes on the spot where it died, and to burn the grass all round it.

It has occurred to the writer that a possible obscure cause of the prevalence of the disease this year may lie in the fact that for years past now the veld has not been burnt, and one may find patches of extremely old grass still in existence. On the chance that this old grass may have something to do with the disease, but principally in order to purify the veld as much as possible, it is intended to burn out systematically various paddocks in rotation as soon as the first rains fall. Grass burning is an evil, but like all other evils there are occasions when some good may possibly be derived from it sufficient to outweigh the bad, and I am coming to the belief that regular, controlled and systematic grass burning, wherever the stock have not quite fed it down,

might be practised with advantage every third year or so. It will not be good for the grass, but may help to prevent disease.

This article has already outgrown decent limits, and I therefore close it by summarising the conclusions I have arrived at, not in the hope or expectation that they will pass unchallenged, but that here and there some other stockman may find some little hint based on actual experience which may help him if called upon to fight quarter-evil on his own ranch.

(1) The disease seems to be infectious, and the quarantining of infected farms and districts may have something to recommend it.

(2) The progress of the disease, the direction it appears to be taking, its virulence, and any other details should be collected systematically and regularly by the Veterinary Department, and published prominently every week in the local Press, so that in future no one need be taken unawares.

(3) The disease must be notifiable under heavy penalties.

(4) If the disease breaks out on your farm, or if you inoculate in advance, inform your neighbours at once. This is only decent and charitable. If it takes a bad form and you lose (say) 20 head, do not say you have only lost two. The fact that you have had quarter-evil will not prevent your selling those young bulls later on, and to escape the disease or only to get it mildly is pure good luck, and reflects no credit on anyone.

(5) See that you have a proper syringe. If you don't need it this year you may the next.

(6) If the disease seems to be approaching, get a supply of vaccine. If within ten miles or so, inoculate at once as a preventive all your younger stock, and be sure you can get enough vaccine of the right kind to do the remainder should it become necessary.

(7) Use single vaccine (red ring tube).

(8) Look with great suspicion on all cases of hoven, and cease to believe in snake-bite.

(9) Burn every carcase to ashes, and report anyone who fails in this duty.

(10) Do not expect natives to report voluntarily cases of quarter-evil among their cattle. They know that to do so means that they may have to gather wood to burn good meat, and all their principles are opposed to any such waste.

(11) Inoculate with proper syringes and suitable vaccine, and your losses will run from nothing up to 5 per cent. Fail to inoculate, and you may lose anything from 5 to 50 per cent. of your cattle. Make no mistake about it, this is a real live disease, different altogether from a little redwater or gallsickness, and you can't cure it with a mixture of paraffin and pain-killer. Those who get it badly, especially in a big herd or on a strictly limited ranch, and escape with a loss of 2½ per cent., like the writer of this article, are fortunate.

(12) In judging how much vaccine to inject, *i.e.*, whether to inject a full dose or a half dose only, according to the age of the animal, it

is better to err on the side of giving a big dose. I have given a number of calves under four months a full dose of vaccine with no bad results.

In conclusion, we who have had experience of this disease may comfort ourselves with the reflection that as we become more civilised and nearer being stocked-up, so the diseases of civilised countries are bound to come our way, and the present outbreak is an assurance that we are getting nearer our goal. Further, now we know more about it, we are not so nervous as when we were groping in the dark. We have still much to learn, and the only way to do this is by means of a full exchange of experiences, and by the guidance of those who, from their professional knowledge, are entitled to teach.

[*Note.*—We welcome Mr. Richardson's contribution on this important subject, but it must be understood that the Veterinary Department accepts no responsibility for the views expressed therein.—Ed., *R. A. J.*]

Note on Quarter-Evil.

By J. M. Sinclair, M.R.C.V.S., Chief Veterinary Surgeon.

At the Veterinary Conference held in Bulawayo in 1913 I expressed the view that anthrax infection existed in Rhodesia to a considerable extent, that it had not been much in evidence since the Occupation because of the destruction of practically all the cattle by the rinderpest and later by coast fever, and that as cattle increased we would probably find anthrax manifesting itself. The same remarks apply to quarter-evil; in fact, I mentioned quarter-evil with anthrax.

There is no doubt that quarter-evil has occurred in various districts throughout the country for several years past, the cause of death being attributed to snake bite, and I venture the following argument as to its assuming such serious proportions recently.

Arloing, Cornevin and Thomas, distinguished French veterinarians, have stated that cattle raised in quarter-evil districts mostly contract the disease at a young age, becoming immunised early by repeated absorption of small amounts of virus. Sir John McFadyean has expressed the opinion that this view is in conflict with the observed facts in England, and suggests that cattle become more resistant, *i.e.*, the elimination of the more susceptible animals by disease gradually

results in a type which is less susceptible, or more resistant, to infection, whichever way one likes to put it.

Because of the inactivity of infection in this country for many years our cattle possess little or no immunity, or alternatively no increased powers of resistance, and when through some cause or other it becomes more active, or more accessible, they readily contract it, and to the ordinary observer the type of disease may, owing to the high mortality, appear more virulent than in areas where it is more generally or constantly present, and where stock-owners are more familiar with it.

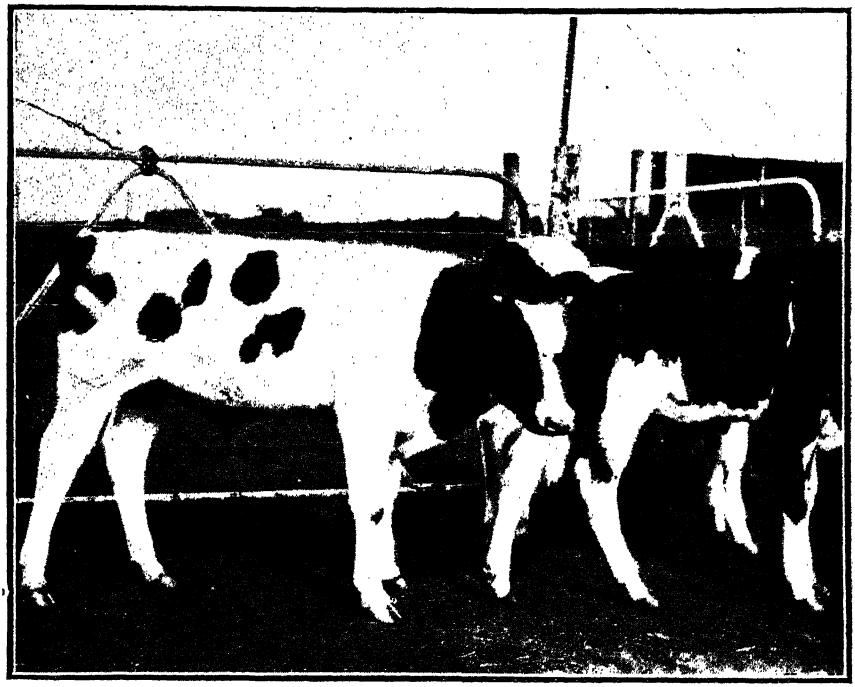
Infection may have gradually increased. It may have suddenly increased because of climatic, telluric or other influences which cannot be determined, but from whatever cause, it found favourable conditions, *i.e.*, susceptible cattle.

Quarter-evil is a disease connected with the soil, and transmission from animal to animal (as in contagious diseases) through intermediary objects rarely, if ever, occurs.

The quarter-evil bacilli seem to be capable of multiplying in the soil, and through their resisting spores to preserve their capacity for development and infectiveness even under unfavourable conditions. That climatic and telluric conditions have some influence or effect in the growth and dissemination of such organisms cannot be doubted. It has frequently been observed in small enclosed grazing areas in the United Kingdom that a number of cases may occur one year, then an occasional case for a year or two, and may be after several years' absence a sudden recrudescence. The infection has been there all the time, and there must be some natural influence at work to result in such erratic manifestation of it. Another observation of some importance is that areas subject to occasional inundations are often heavily infected with quarter-evil.

The conditions which have obtained in Matabeleland during recent years, viz., a series of droughts followed by last year's heavy rains, may have been the actual cause of the widespread infection. To a certain extent a drought restricts infection, because all the bacilli and spores on the surface would be quickly destroyed by the rays of the sun. Those to which the sun's rays or air were not accessible would, of course, be preserved, and after the first rains would be brought to the surface by the new vegetation, or by washing away of the soil; the veld floods would carry them far and wide and establish new centres of infection. Further, every animal which dies establishes a new centre of infection readily accessible to the rest of the herd, and it can readily be appreciated how infection may accumulate unless every carcase is destroyed. It is extremely likely that in many cases the heavy mortality has been the result of a cumulative infection, through leaving the carcases to the vultures and jackals, or cutting them up and trading the meat to the natives.

The following remarks refer particularly to Mr. Stewart Richardson's statements. Quarter-evil is as a rule more prevalent in spring and summer, and the coming season may see an increase, or at any rate





Pure-bred Friesland calves on the Government Experiment Farm, Gwebi.

no diminution of infection. A mortality of 10 per cent. annually or periodically is not uncommon in countries where the disease is prevalent and vaccination not practised. Owners of herds which have had the disease would be well advised to re-vaccinate.

Some mortality amongst animals which have been vaccinated is not uncommon; in fact, it is a frequent occurrence, as shewn by the following figures published by the Bureau of Animal Industry, U.S.A., for the year 1906-7:—

No. of cattle vaccinated—690,826.

Deaths same season previous to vaccination—10,034 equals 1.431 per cent.

Deaths after vaccination—

Within 48 hours—227
Within 2 to 7 days—507 } equals .50 per cent.
Within 1 year—2.734

The statistics for other years are very much the same, also those available from other sources. It is impossible, therefore, to subscribe to Mr. Stewart Richardson's view that because there has been some mortality after vaccination the vaccine used is not the right kind.

There is no evidence that the Rhodesian type of the disease is not the same as that in the Union. The "intensified form" referred to is simply a more intense manifestation of the local lesions; it does not denote a more virulent type of the disease.

It does not appear to me to be necessary to consider the question of making vaccine locally. The United States is a much larger country than South Africa, with a very much greater variation in climatic conditions, yet it has never been found necessary to consider the preparation of local vaccines. The whole of the Government supply is manufactured at Washington from the one and only type of the disease known. The manufacture of vaccine locally could only be justified under present circumstances (1) if the Union could not supply us, and (2) if it were shewn that our type of the disease differed from that in the Union. In the latter case an extended series of experiments, which might take months, may be years, would be required to elaborate a suitable vaccine.

I understand that the results of inoculation generally are not unsatisfactory. Stock-owners must realise that there is always a certain subsequent mortality; that, like other similar processes, there is no mathematical or automatic accuracy. The most that has been claimed for it, I think, is that it reduces the losses to a small percentage.

Quarter-evil is scheduled under the "Animals Diseases Consolidation Ordinance, 1904," as a destructive disease, and notification is obligatory. When the outbreaks began last December, we quarantined for a limited period by notice in the papers, but it soon became evident that such was an unnecessary proceeding. Quarantine if imposed at all would have to be indefinite, because one or two cases may occur in a herd, a dozen next day, or none for years. In this respect we are in the same quandary in dealing with anthrax.

Report on Crop Experiments at the Government Farm, Gwebi,

SEASON 1916-17.

By ERIC A. NOBBS, Ph.D., B.Sc., Director of Agriculture.

PART I.

The number of separate crops grown last year on the Gwebi experiment farm on a commercial scale, that is apart from small plots, was twenty-nine, and consisted of the following, acres planted being shewn in each case:—Maize for grain, 215 acres; maize for ensilage, 15; wheat, 10; oats, 36; millet, 21; velvet beans, 28½; ground nuts, 12; teff, 15; Napier fodder, 10½; Sudan grass, 10; Guinea grass, 4; Indian cane, 2; umfufu, 2; molasses grass, 2½; beggar weed, 2; uba cane, 2; potatoes, 2½; sweet potatoes, 3; dhal, 15½; pumpkins, 6; cattle melons, 7; kaffir corn, 5; tobacco, 4; castor oil, 3; sunflower, 9; buckwheat, 11; linseed, 11; cassava, 6; cowpeas, 1½.

This wide variety speaks well for the potentialities of the farm and of the country. The practical farmer will also realise the labour involved in dealing with so many different crops, especially as there are several different plots of each, and in every case it is necessary to keep records of the work devoted to each and the expense incurred, to note the growth of the crop at different stages, and finally to harvest it separately, and weigh the individual returns from every plot. In addition to the above, other crops were grown on a smaller scale, being still in the earlier stages of trial. These were:—Inyouti, chiroko, chicory and cow cane.

Such prospective but uncertain crops require several years of trial and observation, and the best methods of growing them have to be learnt, whilst acclimatisation is in some cases a factor to be borne in mind.

With certain crops experiments were conducted dealing with manuring, cultural methods, improvement of type, rotation, utilisation and the like, so that the aggregate amounts to sixty-three separate enquiries, envolving 250 plots and 34 different crops, including 52 distinct varieties on 475 acres of cultivated land.

The season was as regards rainfall below normal with 26.44 inches, and in the distribution it is to be noted there was an unfortunate hiatus at the very period of greatest vegetative activity; from 26th January to 16th February, 21 days, no rain fell, and from 10th

January to 8th March only 3¼ inches. This militated seriously against the weight of all crops reaped, but especially those later-sown side crops such as teff grass, buckwheat and linseed, which are put in long after the maize is all planted. Some sown after the drought set in proved complete failures. Such accidents vitiate certain experiments, but are beyond human powers to foresee and avoid. For these reasons the crops are not as heavy as otherwise would have been the case, and this, having been pointed out, may be borne in mind in considering all the following figures. It may be well also to state here once for all that, in dealing with cost of production, no allowance is made for rental or use of land, cost of sacks, transport off the farm, marketing costs or overhead charges, which every farmer can add according to his own views and circumstances.

In dealing with the reports this season the question of monetary returns on the price of the fertiliser has been purposely omitted, owing to the fact that the cost of such artificial manures has of late so risen that the price at which these were purchased for the experiments in question would no longer be any guide for the coming season.

As in former years, much of the success of the results now published is due to the constant care and scrupulous accuracy with which the plans have been put into effect, and the resulting crops separately harvested and weighed by the manager of the farm, Mr. J. H. Hampton, to whom the fullest acknowledgment is due in this connection, and for the preparation of the data on which these reports are based.

Hickory King Maize.—The seed from the various plots of maize has for a number of years past been systematically selected for distribution to farmers for seed purposes and for use on the farm. In this way a gradual improvement in the quality of the grain has been observed, and it is satisfactory to note that the proportion suitable for reservation for seed purposes has steadily increased, shewing the benefit of long continued selection and the advantages of pedigree seed. In all 42 acres of eight-row Hickory King maize were planted. In those plots where the effects of no special fertiliser were under observation, Safco Rhodesia Maize Fertiliser at the rate of 100 lbs. per acre was applied. The average cost of production works out at £1 18s. 4d. per acre, or 4s. 8d. per bag, over 34 acres, the average yield being 1,655 lbs. of grain per acre. In this connection it is interesting to note that the average of the unmanured plots was only 845 lbs. per acre. No unusual treatment was accorded to this crop, which was hoed four times and hand-hoed once. The crop was sown on the 21st November and cut in the beginning of April, the plants being stooked and the cobs removed later by hand. The total rainfall was 26.44 inches, of which 21.97 fell during the growing period.

Maize in the Rotation.—On thirteen of the rotation plots, each three acres in extent, Salisbury White maize was sown following on some other crop. The land was ploughed once, and the seed bed prepared with drag or disc harrow as circumstances dictated. Bain's Maize Fertiliser was applied at the rate of 150 lbs. in three instances; elsewhere no manure was applied where it is intended to provide this

at a different stage in the rotation. Seed was sown in the latter part of November or early in December at the rate of 12 lbs. per acre, and the land hoed as required, generally three, occasionally four, times. The plants were cut down as each crop ripened in April or May and stooked, the cobs being subsequently removed as required for shelling. The total rainfall was 26.44 inches. The average yield from these plots was only 7.3 bags per acre, as against an average of 9.6 last year, the difference being attributable to the season. Details will be found in the accompanying table, and it is to be noted that the last four plots referred to were the latest sown, and suffered especially from the long dry spell in January, February and March, which has obviously much reduced the yields.

The cost of operations per acre exclusive of fertiliser varied from £1 2s. 4d. to £1 4s. 10d. per acre, and the cost of the fertiliser in addition was £1 2s. 6d. per acre.

The cost per bag is proportionate to the yield, and it will be observed varies between extremes of 2s. and 6s. per bag, averaging 4s. 7d.

The returns obtained are shewn in the following table:—

Acre yield of maize in		Approximate cost per bag on the farm.	Manurial treatment.	Previous crop.
lbs.	Bags.			
2,250	11	2/-	Nil	Pumpkins
2,125	10.5	3/3 av.	,,	Velvet beans
1,825	9	3/3 av.	,,	Ground nuts
1,770	8.75	2/9½	,,	Oats
1,670	8.2	5/6	Fertiliser	Maize
1,525	7.5	3/3	Nil	,,
1,475	7.2	3/3 av.	,,	Cow peas
1,520	7.5	3/3 av.	,,	Dhal
1,467	7.2	6/1	,,	Buckwheat
1,080	5.3	4/7	Fertiliser	Velvet beans
1,035	5.1	4/10	Nil	,,
820	4	6/-	Kraal manure	Majordas
750	3.75	6/2	Fertiliser	Mangolds

INFLUENCE OF PREVIOUS SIDE CROPS AND FERTILISERS ON MAIZE.—It has been established by experiments over several seasons that artificial fertilisers applied to a crop of maize one year continue to have an effect

on several successive crops of maize. In the undermentioned experiments it was sought to observe the effect of a number of different crops variously fertilised on a following crop of maize. To this end, Salisbury White maize was sown uniformly over a number of last year's plots where several side crops had been grown in the ordinary manner, without any additional fertiliser this season, and at a working cost of £1 6s. 7d. per acre. A month after sowing the crop was as a whole looking well, the plots where kraal manure had been applied the previous season having a markedly better colour than the rest, maintaining a distinct superiority over all others throughout, and evidently withstanding the lack of rains better than the rest. All the plots were not mutually comparable, but only certain groups. Thus in the previous season wheat, linseed, oats and buckwheat were each treated in these plots alike, and those under maize this year shewed on the unmanured plot the best result after buckwheat, 1,575 lbs. of maize per acre, shewing apparently that this short-lived crop was the least exhausting to the soil; while the oats plot came second with 1,506 lbs. of maize per acre; then that after linseed with 1,205 lbs. of maize, whilst wheat had apparently proved of the four the most exhausting, as the maize yield fell to 950 lbs. per acre.

Where, however, fertilisers had been applied to these crops, the results on the maize are entirely different. This is due in part, no doubt, to the fertiliser remaining in the soil, but also to the fact that whilst the slower growing wheat and oats utilised the fertiliser, they at the same time developed a larger root system and stubble, leaving more matter in the ground, and more thoroughly restoring it after previous maize crops and preparing it for this one. Thus we find the yield of maize per acre to be, when there had been a previous application of double complete Safco fertiliser coupled with a top dressing of nitrate of soda, after wheat 2,175 lbs., after oats 1,830 lbs., and after linseed 1,650 lbs. The buckwheat plot in this case was accidentally spoilt by oxen breaking in and devouring part.

Where double complete Safco had been applied to these crops, but no top dressing of nitrate of soda, the cereals had, it seems, not benefited to the same extent, and had, therefore, not correspondingly improved the ground, and in this case, as in that of the unmanured plots, the maize crop after buckwheat was heaviest, 2,070 lbs., with that after linseed also good, 1,990 lbs., and that after wheat and oats precisely the same, 1,450 lbs. each per acre.

In the next series maize was grown after sunflowers, pumpkins and majordas, each of which had had, on separate plots, 100 lbs. Safco Rhodesia Maize Fertiliser, 8 tons kraal manure and nil respectively. Here the maize after pumpkins was in each case the best, followed by the plots after sunflowers, and those after majordas were last. This is interesting, in that it points to a specific effect of the preceding crop, as the land under pumpkins and majordas is alike uncultivated during the growth of that crop, whereas the sunflower crop is repeatedly cultivated, and is known from other experiments and general practice to be helpful to the succeeding maize crop. These results may best be shewn in tabular form thus:—

Yield of maize in pounds per acre after crop indicated and treated as shewn:—

	8 tons kraal manure.	100 lbs. Rhodesia Maize Fertiliser.	Nil.
Pumpkins	3,190	2,880	2,720
Sunflowers	2,740	2,640	2,125
Majordas	2,485	2,290	1,970

The returns of maize on plots previously under other crops are also interesting, though as they were differently treated, they are not really comparable with one another. After potatoes which had had kraal manure, a yield of 3,150 lbs. of maize per acre was harvested, which corresponds with other yields where this best of fertilisers was used. After ground nuts which had had no manure of any kind, a return of 1,887 lbs. of maize per acre was reaped. Maize after oats which received 100 lbs. Safco and a small dressing of nitroline, gave returns which may be compared to the other oat plots as follows:—

Previous Treatment to Oats.	Yield of Maize in lbs. per acre
100 lbs. Safco plus 30 lbs. nitrate of soda	1,830
100 lbs. Safco plus 50 lbs. nitroline	1,800
Nil	1,506

FERTILISERS FOR MAIZE.—At the request of the Delegation of the Chilean Nitrate of Soda Propaganda, of Bloemfontein, a series of experiments was conducted with artificial fertilisers supplied expressly for the purpose. The experiment consisted of comparisons first of basic slag and superphosphates, second of different quantities of a complete mixture, and finally of the application of fertilisers at seed time or subsequently. This entailed the use of twenty-four plots, the unfertilised control plots numbering eight.

The ground chosen consisted of old land long under cultivation, and known to be poorer than other parts of the farm, and where the effect of fertilisers might be expected to be clearly brought out. The land was well prepared and sown with eight-row Hickory King at the rate of 12 lbs. per acre on 22nd November, in rows 40 inches wide and 15 inches between the plants; thereafter hoed four times, and hand-hoed once. The crop was cut and stooked early in May, and the cobs removed in August.

The returns are shewn in the accompanying table. Comparing complete mixtures containing in the one case superphosphates, in the other basic slag, it will be observed that in every instance the latter has given the better yield—a somewhat striking result, in view of the fact that this form of phosphoric fertiliser is very seldom used in this country, where the use of the acid form of superphosphate has become the general rule.

As regards the proportions, it is found that the heavier dressing of 150 lbs. per acre both with superphosphates and with slag gives the greatest return. It is peculiar that in each case the lightest dressing of 63 lbs. gives a better return than the medium one of 102 lbs., and the reason of this is not apparent, for each of the ingredients is proportionately reduced. The figures can only be recorded.

The practice of applying the fertiliser at the time of planting is fully justified by the duplicate series of experiments in which the same dressings are put on a month later. In every case the yields are less, and the heaviest dressing seems to be actually prejudicial, for both where superphosphates and where slag was used the yields were less than the average of four unfertilised plots. The later application exerted no apparent influence on the dates of ripening, and, apart from the partial drought, all other conditions for the experiment were favourable.

Net weight of fertiliser.	Composition of fertiliser in pounds per acre.			Yield in pounds per acre for fertiliser applied.	
	Superphosphate.	Nitrate of soda.	Sulphate of potash.	At planting.	One month later.
(1) Nil	...	...	...	831	...
150	112	22.4	15.6	1,485	675
102	75	16.2	10.8	1,320	1,050
(2) 63	45	10.8	7.2	1,437	975
	Basic slag.	Nitrate of soda.	Sulphate of potash.		
(1) Nil	...	...	...	859	...
153	115	23	15	1,515	825
102	76.5	15.3	10.2	1,500	1,485
(2) 63	47	10	6	1,530	1,380

(1) = Average of four plots.
(2) = Average of two plots.

Plots were arranged for the purpose of comparing a number of different artificial fertilisers now on the market. Most unfortunately these experiments were rendered of no avail. It was found that, apart from the manuring, the land shewed a lack of uniformity which itself vitiated the experiment. Thus the harvested yields from fertilisers which for several years past had given profitable returns were less than from the untreated control plots, and were also inconsistent with

one another. In addition, the fact that there was no useful rain from the middle of January to the middle of March, at the very time when the influence of the fertilisers should become apparent, further rendered the results misleading. This is to be regretted, although in any case these comparisons would have been less instructive this season than in the ordinary conditions, owing to the fact that the price on which they were based has entirely altered for next season, whilst the composition of certain well-known brands is not the same as it was in past years. As the results can in no way be regarded as a reliable guide, it is considered advisable to refrain from publishing them.

It may, however, be stated that on 12 plots separately weighed, and extending in all to 60 acres, Hickory King (ten-row) maize yielded returns varying from 925 lbs. to 1,748 lbs., and averaging 1,290 lbs., or 6.5 bags per acre.

Maize and Pumpkins.—A test was made in connection with these experiments of the common practice of mixing maize and pumpkins together, the former being sown in the usual drills 40 inches wide and 15 inches apart, and the pumpkins being put in 12 feet by 10 feet, and receiving round each hill Rhodesia Maize Fertiliser at the rate of 100 lbs. per acre. Planted in the middle of November, the pumpkins flowered in the beginning of January. Probably owing to lack of rain the pumpkins planted amongst the maize died out during February. Harvest revealed the fact that when grown together a yield of 666 lbs. only of pumpkins and 1,840 lbs. of maize per acre was obtained, whereas when grown separately a yield of 6,400 lbs. of pumpkins and 1,800 lbs. of maize per acre was produced. From this it would appear that in a season such as the last the maize crop did not suffer at all from the presence of the pumpkins, whilst the pumpkins suffered severely from the maize, which seems in this combination to make the first call upon whatever moisture is available in the soil.

African Coast Fever.

In continuation of the abridged report of the Chief Veterinary Surgeon which appeared in the last issue of the *Journal*, the following schedules are now published for general information:—

(A) A corrected return of the number of fresh outbreaks from 1906 onwards. For the years 1903 to 1905, inclusive, exact records are not available, but the extent to which infection existed throughout the Territory during this period may be judged from the statement in the report of the Chief Veterinary Surgeon for the year ending 31st

March, 1905, that "several districts, notably in the north of Salisbury and the Mangwe district south of Bulawayo, are still free from the disease."

(B) A return of the monthly mortality during the year at the various infected centres except Melsetter.

(C) A return of the monthly mortality in Melsetter for 1915 and 1916. In the case of Melsetter district, the figures for 1915 are included for the purpose of comparison, and in this the first figure shewn indicates the month in which the outbreak occurred, except on farm No. 1, which occurred in August, 1914. The heavy mortality which occurred in the Melsetter district up to July, 1916, may be attributed to the fact that in most cases the disease had become firmly established before dipping tanks were ready for use. The considerably diminished mortality in the outbreaks from August, 1916, onwards is due chiefly to the institution of dipping either some time previously to or immediately on the discovery of infection.

SCHEDULE "A."

AFRICAN COAST FEVER.

	Fresh Outbreaks.	Mortality.
1903.	—	15,770
1904.	—	3,500
1905.	—	—
1906.	7	732
1907.	2	358
1908.	4	290
1909.	8	196
1910.	19	347
1911.	28	1,036
1912.	5	505
1913.	6	172
1914.	6	199
1915.	35	1,174
1916.	20	382

Number of cattle in the country, 1905 ... 66,369
" " " 1915 ... 840,916

SCHEDULE "B."

AFRICAN COAST FEVER.

Infected Areas and Mortality, 1916 (not including Melsetter).

District.	Farms or Area.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Existing outbreaks—													
SALISBURY ...	Borrowdale ...	8	1	...	...	...	...	...	...	...	...	...	...	9
	Glen Lorne ...	1	5	...	...	...	...	...	...	...	...	...	...	6
	Sternblick ...	6	2	2	...	...	...	...	...	...	...	...	...	10
	Greystone ...	...	1	...	...	...	...	...	...	...	...	...	...	1
MAZOE ...	Mazoe	1	1	...	...	...	...	...	...	...	...	...	...	2
	Fresh outbreaks—													
	Welbeck ...	...	...	...	...	2	...	...	...	...	...	...	...	2
GWELO ...	Riverbend ...	...	...	...	...	2	15	3	5	...	...	...	...	25
	Cross Roads ...	...	...	...	...	...	2	1	...	...	...	3	2	8
MREWA ...	Mangwendi Reserve	...	...	...	...	51	18	11	20	...	...	...	...	100
		16	10	2	...	55	35	15	25	...	...	3	2	163

MELSETTER DISTRICT.

Infected Farms and Mortality.

No. of Farm	Original No. of Cattle	1915												1916												Total 1916	Gross Total
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1	115	1	14	38	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	86*
2	209	2	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	.	...	...	...	...	...	...	...	...	2
3	253	24	63	13	1	2	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103
4	118	...	6	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	8
5	84	...	...	...	10	41	10	2	3	13	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	83
6	134	...	...	...	1	3	35	10	...	...	1	...	...	6	8	5	1	...	..	...	...	...	...	...	...	20	70
7	152	...	...	...	8	8	14	2	8	30	5	1	3	1	3	...	2	1	...	...	...	..	...	...	...	7	86
8	131	...	...	...	8	30	20	16	26	2	3	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	110
9	176	...	...	...	...	9	10	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23
10	104	...	...	...	...	8	...	...	...	...	21	...	2	...	...	..	...	...	...	...	...	...	...	...	...	...	31
11	94	...	...	...	...	1	52	2	11	2	2	1	...	...	...	...	...	...	..	...	...	...	...	...	...	...	71
12	87	...	...	...	...	1	...	...	6	4	7	1	2	1	...	1	...	...	...	...	...	...	...	...	...	2	23
13	102	...	...	...	...	...	12	1	...	...	...	...	...	1	2	3	...	...	...	...	...	...	...	...	...	6	19
14	134	...	...	...	...	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
15	111	...	...	...	...	...	...	11	22	5	12	15	2	10	3	...	1	1	4	1	...	...	1	...	...	21	88
16	187	...	...	...	...	...	...	11	...	2	...	22	38	9	10	12	...	3	3	...	...	...	...	...	...	37	110
17	244	...	...	...	...	...	...	3	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6
18	81	...	...	...	...	...	...	...	43	17	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	69
19	22	...	...	...	...	...	...	...	...	2	10	1	4	1	...	1	...	...	...	...	1	...	...	...	...	3	20
20	54	...	...	...	...	...	...	...	...	1	2	5	...	...	...	...	...	...	2	1	...	...	...	...	...	3	11
21	17	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
22	22	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
23	18	...	...	...	...	...	...	...	...	...	...	2	...	1	4	3	2	1	...	...	...	...	...	...	...	11	13
24	147	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
25	119	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...	...	...	...	2	3
26	44	...	...	...	...	...	...	...	...	...	...	...	...	12	1	2	...	6	13	...	...	...	...	...	...	34	34
27	38	...	...	...	...	...	...	...	...	...	...	...	...	12	10	12	...	...	...	...	...	...	...	...	...	34	34
28	290	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	2	6	...	...	...	...	10	10
29	141	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	7	1	...	...	...	...	...	...	...	9	9
30	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1
31	78	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	1	...	...	...	...	...	...	...	...	1	1
32	141	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	2	2
33	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	1
34	44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	1
35	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	...	...	...	...	...	5	5
36	203	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	2	2
37	115	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	1
38	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	...	...	...	...	6	6
39	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	1
	4,207	27	83	53	30	104	164	63	122	80	75	35	54	30	54	41	22	21	21	19	4	6	1	...	...	219	1,149*

* Includes 30 head from 1914.

from the Plumtree district right over the heart of Matabeleland has been the subject of a good deal of argument, mostly, as usual, based on unproved assumptions. One of the commonest of these is that the disease has followed the line of the late rains, which therefore must be held to be the predisposing cause. This argument appears to be fallacious, for the weather conditions in the Plumtree district in December, 1916 (midsummer), and those prevailing in, say, the Bubi district in July, 1917 (midwinter), can have very little in common.

It is held by many, possibly by the majority, that quarter-evil is not infectious in the sense that, *e.g.*, lungsickness is. But if quarter-evil is not infectious, it is difficult to account for its orderly and continuous progress from farm to farm. I understand that in parts of Europe quarter-evil is held to be infectious, and is therefore a notifiable disease, and if this is so, there would appear to be good grounds for our at least considering methods to check the evil based on the assumption that it may be infectious. It is certainly not sporadic in the usual sense. The opinion on this point arrived at by the writer, without of course his having any scientific authority or knowledge on which to base his argument, is as follows:—

It seems to be certain that the germs of quarter-evil exist practically everywhere throughout Matabeleland, but normally only very occasionally give rise to any losses, and then only to a trifling extent. But it is at least possible that, as I understand sometimes happens in other diseases, some other germ carried along the ordinary channels of infection may be the predisposing cause whereby the quarter-evil germ is awakened to activity, in much the same way as the gall-sickness microbe only gets its chance when its host's vitality has been reduced by a previous invasion by the redwater germ. It is just possible that some highly infectious microbe, in itself practically harmless, and possibly ultra-microscopic, gets carried from farm to farm, and by its action on its host allows the ever-present quarter-evil microbe to become active. I merely put this forward, with the greatest diffidence, as a possible explanation of the recent occurrences. In addition to the above supposed means whereby quarter-evil may be spread, there is the assured risk of infection from undestroyed carcases. Meat and hides can be carried long distances by natives, or sold by unscrupulous or ignorant Europeans, while vultures and jackals and kaffir dogs can undoubtedly infect large tracts of country if allowed access to dead cattle.

On the foregoing lines of reasoning, therefore, a fair case might be made out for treating quarter-evil as a notifiable disease, for the stopping of all movement of cattle in an infected area, and the strict quarantining of infected farms. Personally, I am strongly in favour of such a course being taken. Had quarter-evil been made a notifiable disease from the start, dozens of ranchers and farmers would have been made aware that a great danger was slowly approaching them. As it is, the majority of sufferers have been taken completely by surprise. When prompt action as regards the treatment to be adopted was a vital necessity, cattle-owners only woke up and began to ask, "Shall I inoculate or not?" when the disease was on the next farm or

Notes on Live Stock and Produce at the 1917 Shows.

LIVE STOCK.

VICTORIA SHOW.—A noticeable feature here was the increase in the number of entries and the improvement in the conditioning of animals for exhibition, which shews that a live, intelligent interest in stock matters exists in the district, and that breeders are striving to produce a first-class modern beast.

The grade bulls, an important feature of a show held in the centre of a ranching area, shewed that breeders are rapidly acquiring a more perfect knowledge of the most profitable type of animal to use; and there was, on the whole, a pleasing absence of those leggy, weak-constitutioned, nondescript animals so conspicuous in former years. There is, however, still room for improvement, and we would suggest to breeders in this district that a reasonable amount of feeding, in addition to care in selection of grade bulls, would repay them. If a bull is good enough to use, whether pure or grade, he is worth feeding and housing at nights, especially during his first two winters.

We were sorry to see ticks on some of the exhibits, but since compulsory dipping is now in force in the district, the fault should be remedied in future.

Mr. James Struthers took the lion's share of prizes, including the championship, which was awarded to his North Devon bull, thus beating Mr. Richards' good Shorthorn, which was champion last year. Mr. Struthers well deserved his success for the encouragement he has given and the example he has set to breeders in his district.

BULAWAYO SHOW.—The classes at this show were far too numerous for us to treat of them in detail. We are glad to note that the number of entries continues to increase, and the quality of the exhibits is well maintained. A striking feature this year was the very strong class of North Devons, indicating that this breed is increasingly recognised as suitable to some parts of the country, notably the drier granite areas. "Northmore Moneymaker," the property of Gwynne's Rhodesian Estates, was awarded premier honours, the runner-up being Messrs. Austin & Good's "Waterfall Lupin." In the Shorthorn classes, which were well filled, Mr. Drummond Forbes's well-known bull "Lomond" again secured the highest award, beating Mr. E. H. T. Mitchell's "Aldsworth Bard," and eventually and for the third time winning the Thousand Guinea Trophy against Messrs. Cooper & Nephews' Hereford bull "St. George." The champion certificate for the best Shorthorn female was awarded to the B.S.A. Company's grand cow "Peony," against the same owners' "Laura." Subsequently "Peony" was declared champion female in the yard, Mr. John Mack's Aberdeen Angus heifer "Mynhurst Valour" running a good second.

We regret to record the unfortunate death, shortly before the show, of Mr. Geo. Fath's bull "Bilsington Imperieuse," and the fact that, owing to restrictions, Messrs. James & Worthington's bull "Cameron Balnakyle" was not present. Both of these bulls gave great promise last year, and we had hoped great things of them.

The Aberdeen Angus bull class was well represented, the most notable specimens being Mr. Nairn's "Prince Gondolier of Malben," and Mr. A. E. White's "Emigrant of Cromdale." We should like to see more females in the classes of this breed, and of the same quality as Mr. Mack's beautiful heifer "Mynhurst Valour."

Herefords were much in evidence, and indeed Bulawayo may be regarded as the home of this breed in Southern Rhodesia. Excellent specimens were on view from the herds of Messrs. Cooper & Nephews, C. S. Jobling, H. B. Gibbons, Geo. Mitchell and Beamish Bros., all Bulawayo men, while Mr. John Mack, of Gatooma, represented the Midlands. Messrs. Cooper & Nephews' bull "St. George" beat all comers, but had a good run for his money from Mr. C. S. Jobling's Rhodesian-bred "Devonby Dandy." Messrs. C. S. Jobling, Cooper and Nephews and Beamish Bros. provided the winners in the female classes.

Breeders of Sussex and South Devons are not numerous, but the De Beers ranches shewed, as usual, a number of good Sussex, while Major Bolitho was responsible for most of the South Devons, all good animals.

The dairy breeds were not strongly represented, a fact which is not surprising, seeing that all the western portion of Matabeleland is essentially a beef-producing country.

The prize for the best group was won by the B.S.A. Company's Shangani Estates, who beat Mr. Drummond Forbes, both groups being Coates Shorthorns.

Pigs and sheep were not very strongly represented; the former were very moderate in quality, and the latter were provided mainly by some excellent woolled Persians, both pure and grade, the property of Mr. Walker and of Mr. A. G. Hay.

We had hoped to see the exhibits in the slaughter cattle classes better throughout than they were. Mr. E. A. Hull shewed five grade Lincoln Red bullocks of first-rate quality, but, generally speaking, the slaughter bullocks shewed a lack of finish. We would suggest, if we may, that on future occasions these classes should be divided into two sections—one for bullocks for local consumption and one for bullocks for export purposes.

We congratulate the committee on the continued improvement in the arrangements of the show, and particularly on the provision of three excellent judging rings, which very materially increase the comfort of the judges and the public, and fill a long-felt want.

UMTALI SHOW.—In spite of many drawbacks and difficulties, the show was excellent. Here the increase in the number of entries of cattle was most encouraging, and the whole tone of the cattle sections points to the growth of intelligent interest in cattle matters in the dis-

trict. Circumstances have rendered it necessary in the past for the committee to restrict the number of classes, with the result that the judges have frequently had to adjudicate between beef and milch animals in the same class, a most difficult task. We have no doubt that, with the increase in the number of entries, it will be possible to remedy this in so far as concerns predominant breeds, and, as at Victoria, we would impress on the breeders in the Umtali district the value of conditioning animals both for show and stud purposes, and would urge them to take more care in training their animals to lead when being exhibited. A most important innovation at this show was the one-day milking competition. In this class eight good grade Shorthorn and Friesland cows competed for a cup presented by Mr. J. Meikle, and were judged on points approximately similar to those adopted by the British Dairy Farmers' Association. The result went far to prove the value of the grade cow as a butter producer. In one case a small grade Mashona cow, aged, the property of Mr. Cockerell, shewed herself able to produce 1.2 lbs. of butter fat per diem; while another grade Friesland, belonging to Mr. Barry, was found to be equal to 3 galls. of milk per diem. An encouraging result of the competition was the immediate formation amongst several prominent dairymen of a testing association, and we look forward to a most interesting competition of this kind next year.

Hartley Show.—This show was, for the first time, held on a very excellent ground at Gatooma. One hardly expected to see great numbers of stock here, but the B.S.A. Company's Shangani Estate, Messrs. Woodforde, Jack Mack, Champion Bros., J. Dalton and others stalled a number of cattle of very first-class quality, and some interesting competitions took place in the Shorthorn classes. Mr. Woodforde secured the championship with his good bull "Prince Worcester," and managed to secure premier honours in the Shorthorn group class against the B.S.A. Company's winners at Bulawayo, notwithstanding that the B.S.A. Company's group contained that great heifer "Peony," probably the best animal in Rhodesia. Mr. Jack Mack shewed a number of good Herefords recently imported, and the same Aberdeen Angus animals as he sent to Bulawayo.

Against the above-mentioned breeders, anything but first-class animals, of course, held little chance, but we feel sure that such an exhibition of good stock in the district will go far to inculcate a spirit of emulation amongst those breeders who have hitherto not been prominent, and that in future years the prizes will be distributed over a much larger number of exhibitors.

The pig and sheep classes did not appear to have been taken very seriously, and we would recommend pig breeders to pay more attention to this line of business.

The slaughter stock classes, considering the season, were good; but once more, at the risk of becoming tiresome, we must remind exhibitors that to shew an animal in anything less than show condition is not profitable, and we would ask them to take thought a little earlier in the year for the animals they intend to shew, and thus give themselves time to get such animals into condition.

PRODUCE.

It is gratifying to note the great progress made in the selection and preparation of produce for exhibition at the various agricultural shows. Although the 1916-17 season had on the whole been unfavourable for crops, the quality of the exhibits in the produce sections shewed a great advance on previous years. This was more particularly the case with maize both in the cob and in the grain classes, and it is becoming increasingly obvious that the quality of grain produced in this country is steadily improving. Such improvement is due no doubt partly to the great fillip given by the competition afforded at the agricultural shows, and no better proof of their utility is needed than the rapid advance made in recent years in the all-round quality and variety of the produce staged.

The season opened with the Victoria show on the 23rd May, and although the date was early, this was the only one at which any inter-district exhibits were shewn. The cup in this section was won by an exhibit prepared entirely by Mr. Struthers, consisting of an extraordinary variety of farm produce. It is hoped that this competition will continue to be a feature of the Victoria show, as it undoubtedly was one of the main attractions in the produce section on this occasion. Entries on the whole were not numerous in most classes, maize being an easy first, with half a dozen entries in some cases.

The Bulawayo show is usually much handicapped in the produce sections by the early date at which it is held. Of late years, too, the unpropitious seasons have militated against a display of agricultural produce. Nevertheless, in respect of fodders and cattle foods in general this show is second to none, and the display of majorda melons this season was perhaps the finest ever seen at any Rhodesian show, some weighing close on a hundred pounds. Messrs. Laing Bros., the Shangani Estates and Mr. M. J. Rorke were the principal winners, in the face of very keen and considerable competition. In the maize classes the exhibits shewed far greater care in selection than in former years, and the principal winners—Messrs. Cecil Roberts & Letts, Mr. H. P. Holl and Mr. L. G. Robinson—are to be congratulated on producing such fine results in Matabeleland.

The produce display at the Umtali show was not up to its usual standard of excellence, particularly in point of numbers. The maize section has always been a great feature at this show, and this was again perhaps the best represented, the quality on the whole being good, as is shewn by the fact that some of the Umtali exhibitors were winners at the Salisbury show. In the maize sections the premier honours were obtained by Mr. Norris, Mr. Harvey and Mr. Cockerell, in the face of considerable competition, while in the general produce classes the gold medal for the highest aggregate of prizes fell to Mr. J. Meikle; Mr. A. Strickland and Mr. Harvey also shewing up well. The variety of produce as a rule at Umtali is equal to any in the country, and it is greatly to be hoped that this feature will not be allowed to fall behind its former high standard of excellence.

At the Gwelo show the produce sections obtained great prominence, partly owing to the absence of stock, and the exhibits on the whole

surpassed any of the previous efforts of this district. One of the most attractive featurs of this show is the competition for the produce of one farm. In previous years Mr. P. T. Webb's display has proved a great attraction. This year Miss Steedman and Miss Skaife took first prize with an exceedingly varied and well prepared exhibition of produce off the farm Gando, second place being taken by Mrs. S. E. Spurr. The maize exhibits at this show deserve special mention, the quality being extraordinarily creditable for such an adverse season as that just experienced. The competition for seed maize, requiring three bags of maize and cobs, produced ten entries, and Messrs. Bradley Bros. are to be congratulated on winning first place and highly commended. In the maize cob classes, too, premier honours went to the same exhibitor.

The Salisbury show, as might be expected, is perhaps the leading produce show of Rhodesia, and this year's display proved no exception to the rule. The absence of the inter-district competition was a matter for great regret, particularly in view of the success attained last season. This loss was largely made up by the general excellence of the maize classes, where the entries were unusually large, and competition unusually keen. A very gratifying feature of the maize classes, and indeed of most of the other produce classes, is the improvement in the quality of the individual exhibits each year. Both Mr. F. C. Peek and Mr. J. Dawson are to be congratulated on the excellence to which their exhibits have attained. The cup for the highest aggregate of points in the maize classes this season was won by a small margin by Mr. Peek. Mention must also be made of a very beautiful cob of Salisbury White maize shewn by Mr. Harvey, of Umtali. This specimen was almost perfect, and when it is remembered that the Salisbury White variety is a local production, all the more credit is due to those breeders who are endeavouring to improve and fix the variety. Mr. Dawson's strain of Hickory King is probably the best in Rhodesia, and growers of this variety who are anxious to improve the quality of their crops cannot do better than secure seed from this source. In the weight of grain to cob class a new record was put up by Mr. Peek's exhibit of Salisbury White cobs, which weighed out 92.5 per cent. grain, the actual weights of the nine cobs being, grain 104 ozs., core 8 ozs. A new departure in the produce classes deserving mention was made by the committee this year in including a "special prize" class for any exhibits not provided for in the prize list, and thus enabling the progressive farmer with new crops to shew these with some chance of recognition. This class drew ten entries, of which four were considered worthy of a special prize, including a sack of soy beans by Mr. Mossop, of Glendale, a new cattle melon by Mr. Newmarch, and an exhibit of rye by Mr. Gresson.

CITRUS AND OTHER FRUITS.

The quality of the fruit exhibited generally at the shows this year shewed considerable improvement, and indicates that Rhodesia can produce high-class oranges suitable for export overseas. The boxes packed for export marked a distinct advance in the direction of packing. While the citrus industry is only yet in its infancy in this country, it is advisable for growers to pay the greatest attention to the proper

picking, grading, sizing and packing of fruit, as unless this work is thoroughly carried out in the correct manner, the result will certainly be unsatisfactory.

At Umtali, Rusape, Gatooma and Salisbury citrus fruits were well represented. At Rusape the exhibition was small, while at Umtali, Gatooma and Salisbury the display was excellent, especially at the latter place, where the staging also was well done.

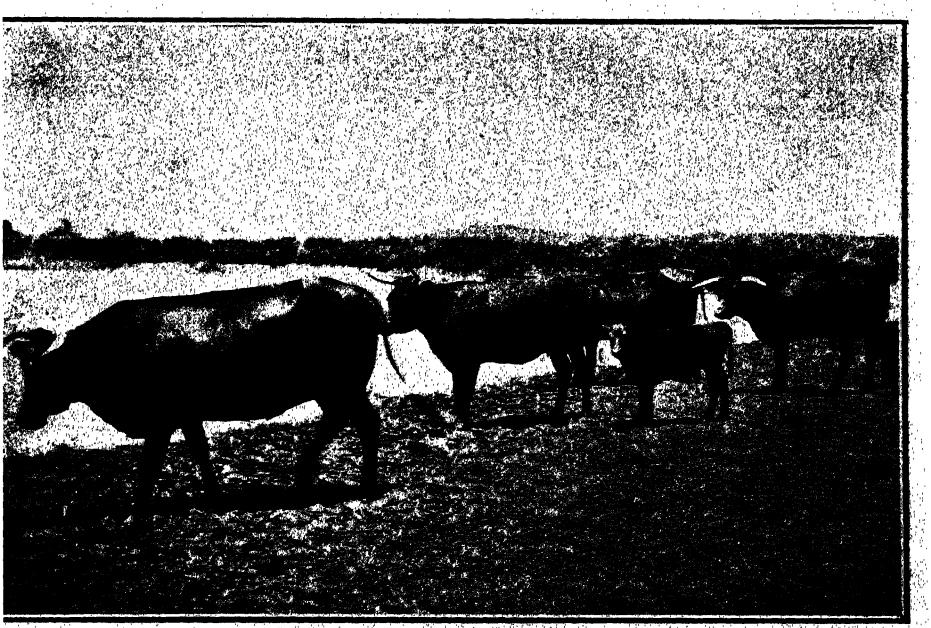
UMTALI SHOW.—There were fewer exhibits than last year, which was possibly due to the fact that at the 1916 show particular comment was made on the number of exhibits shewing signs of scale, which it is gratifying to record was noticeable by its almost entire absence this year. While it is very satisfactory to note cleaner fruit was shewn, it is unfortunate that more growers do not interest themselves in exhibiting. Of the boxes of oranges packed for export, those awarded first and second prize were both well packed, although the second award was wrongly nailed up. Washington Navel oranges were rather disappointing; the first prize lot, although well coloured and of a good even size, were a little lacking in flavour. The two first awards in Valencia Lates were good samples of this variety. Mediterranean Sweets were very good oranges, and the best flavoured fruit on the show. The Jaffas awarded first prize were fine oranges, but not quite true to type. A lot of seedling oranges, shewn by Mr. J. Meikle, were splendid, beautifully flavoured fruit and of nice appearance. Among the classes for naartjes, the Old Cape variety shewn by Mr. A. Strickland were particularly good. The few exhibits of grape fruit and lemons were good sound fruit. The first and second prize paw paws were particularly fine specimens out of a class of eight exhibits, all of which were good samples of this fruit. Only one exhibit of pineapples was shewn, and these were really good, and demonstrate the possibility of growing this fruit, for which there is always a demand.

GATOOMA SHOW.—It is to be regretted that several growers who exhibited at Hartley last year failed to make any entries at Gatooma this year. In spite of this, some good fruit was staged. The boxes of oranges packed for export attracted a good deal of attention, as this was the first time many of the visitors had seen oranges properly put up for oversea markets. Amongst the individual classes for different varieties, Washington Navel, Valencia Late and Joppa were well filled with good specimens, especially the first prize Valencia Lates, which were excellent, and by far the best orange on the benches. Mediterranean Sweets and Jaffas were rather poor, but the one exhibit of seedling oranges was nice clean fruit, fairly free of seeds. Lemons, limes and naartjes were represented by exhibits of good quality.

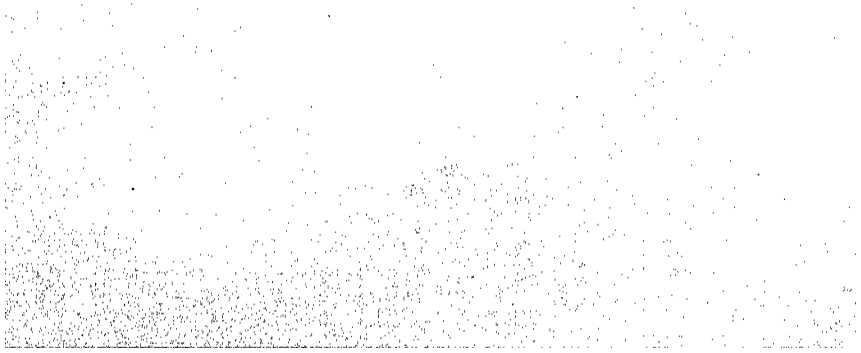
SALISBURY SHOW.—There was an excellent collection of citrus exhibits, and it was probably the finest display held in Rhodesia of fruit suitable for export. On the whole the exhibition attracted considerable attention, few people apparently realising that such excellent fruit can be grown in this country. The boxes of oranges packed for export were a good class, and a distinct improvement in every way on any exhibited at previous shows, both in the get up of the boxes, packing and nailing



Troop of horses bred by Mr. W. F. White on Vrygewecht Farm, Figtree.



Grade North Devon-Africander Cattle on Mr. W. F. White's Farm Vrygewecht.



up. Washington Navel oranges were an excellent class. The first prize was awarded to the Mazoe Citrus Estate for beautiful specimens, while the second and third prizes went to the Sinoia Estate and C. C. Macarthur for very good fruit. In the class for Valencias, the first prize also went to the Mazoe Citrus Estate, a special prize being given this exhibit for the finest fruit on the show. These Valencias were perfect specimens of the variety, and would undoubtedly have taken a prize at any show in South Africa. There was a nice exhibition of Mediterranean Sweets from the Premier Estate and also from E. W. S. Montagu. The Jaffas from G. Lamb were a typical sample, as also the Joppas from the Premier Estate and G. Lamb. First and second prizes were awarded to P. Reimer for excellent seedling oranges. There was a splendid exhibit of grape fruit sent in by the Mazoe Citrus Estate, while limes from W. Abbott and naartjes from G. Lamb and G. V. van der Byl were awarded prizes in these classes. It was noted that some exhibits at this show had been polished; this should not be done. Fruit should be exhibited as picked from the tree, with its natural bloom.

Nature Notes.

V THE SNAKES OF THE PLUMTREE DISTRICT.

By Rev. Father O'Neil, S.J.

Few parts of South Africa appear to be more snake-infested than the well-wooded and dry tract of country immediately to the east of the Tati Concession. In this hot, sandy district, some twenty miles to the south of Plumtree, is the large native mission station of Empandeni, and I propose in this paper to say something about the snakes I came across or heard about during a residence of seven years at the mission station, my object being to give readers of this *Journal* an idea of the snakes with which Matabeleland abounds, and to induce someone to study these interesting, if repulsive, reptiles, and add to our knowledge of the ophidia of Southern Rhodesia.

It may be well at starting to say that, in addition to the harmless blind snakes, and the boiadæ, or pythons, and their allies, there are three main divisions of snakes, viz., the Aglypha—the solid-toothed, non-poisonous snakes; the Opisthoglypha—the back-fanged snakes, all of which are more or less venomous; and the Proteroglypha—the highly

venomous, front-fanged serpents. These three divisions are well (too well, many people think) represented in Rhodesia, and while at Empandeni I made personal acquaintance with several members of each of them.

Of the Aglypha, or solid-toothed snakes, South Africa possesses at least thirty known species, all except one or two of which belong to the sub-family *Colubrina*. This sub-family includes the fresh-water snakes, the large mole snakes of the Cape Province and many others. The most remarkable member of the family at Empandeni is the file-snake, *Simocephalus capensis*, a rather large serpent, known to the natives as *Ingongotsha*. The Matabele erroneously consider the snake to be very poisonous, and they are much afraid of it, probably because it at once shews fight and hisses loudly when approached. In reality the snake is quite harmless to man, though not so to its fellow snakes, as evidenced by the fact that I once met a file-snake in the act of swallowing a black cobra over 4 feet long. According to Fitzsimmons, the colour of the upper portion of the body is brown, with the central raised keel or ridge yellow. The three specimens I saw at Empandeni were light yellow above and the ridge down the centre was straw-coloured. This prominent straw-coloured keel gives the snake a very distinctive appearance. At Empandeni, as elsewhere, the file-snake is rather rare. The snake is fairly thick, and adult specimens are fully 5 feet in length.

A much smaller colubrine snake, *Boodon lineatus*, the brown house snake, is common in the district, and I saw several there, most of them half-grown specimens between 1 and 2 feet long. The popular name of this little snake is well merited, as it is frequently found in or close to houses. There are several other members of the colubrinæ at Empandeni, one of them a brown water snake. The others seem to be rare, and the specimens killed by natives and brought to me were too much damaged to be worth preserving.

Of the back-fanged snakes I remember seven or eight kinds, all of them belonging to the sub-family *Dipsadomorphinæ*. First there was the well known boomslang, *Dispholidus typus*, which is common throughout South Africa, and is abundant in Rhodesia. This snake is very variable in colour, and we had at least two colour varieties at Empandeni, one of them being the ordinary dark green form, spotted with minute round yellow dots, and the other uniformly ochreous or olive brown. The natives, whose knowledge of snakes is rather vague, think that the two forms represent two totally different serpents, and they call the first *Inyandezulu*, while to the ochreous variety they give the name of *Ipimpi elimhlope*, or "the white cobra." At Empandeni this latter form is far the commoner of the two.

The Matabele give the same name, *Ipimpi elimhlope*, to another and far more slender back-fanged snake, *Psammophis sibilans*, the hissing sand snake, a light-brown serpent marvellously rapid in its movements. One day I turned round sharply, hearing a sound behind me, and beheld one of these snakes in the path within a yard of my legs. The next moment it was fully thirty yards away, and so swiftly had it glided off that I had been unable to follow its course with my eyes.

Of schaapstikers, we had two very common species. One of these, which the natives call *Umhlwazi*, is the pretty little striped schaapstiker, *Timerorhinus tritæniatus*, light brown in colour, with four darker stripes down the body, the underside being light yellow. This snake is of slender form, and is usually about 2 feet long. The natives consider it to be harmless, but if they experiment with it they will find out their mistake.

A considerably larger schaapstiker, of light grey colour, is often seen motionless in small bushes, and is known to the natives as *Inkonkotc*. I once noticed one of these snakes with an unfortunate chameleon in its jaws. I rescued the victim and killed the snake, and then the ungrateful chameleon bit my finger!

Another back-fanged snake found, though rarely, at Empandeni is the tiger snake, *Telescopus semiannulatus*, a pretty species of yellow colour, variegated by large black spots, fairly thick, and between 2 and 3 feet in length. Its native name in Matabeleland is *Inkwakwa*.

One of our rarest dipsadomorphinæ was the herald or red-lipped snake, *Leptodira hotamboia*, of dark brown colour, with the upper lip scarlet or orange red and the head glossed with purplish black. This is a fairly thick snake, from 18 inches to 2 feet long, and it is much dreaded by natives, and by many white people too, as it is very fierce if you attack it, and makes desperate efforts to bite. However, the poison fangs of this snake are set far back in the jaw and are small, so that its bite is seldom dangerous. I have seen a good many of these herald snakes in the Cape Province, and captured one in a room; but at Empandeni it is far from common, and I only met with a single specimen there. The natives could give me no name for it.

We had, to my knowledge, two more of the back-fanged snakes on our mission farm, both belonging to the genus *Calamelaps*, and each of them shining black in colour with a purple gloss. One of the two, *C. concolor*, is known as the purple-glossed snake, and the other, *C. warreni*, discovered only a few years ago, has been named Warren's snake. I found a single example of each of these while at Empandeni, one of them in the act of entering my room after nightfall, and captured both, each being about a foot long. As these snakes are exceedingly rare, they are regarded as great treasures by collectors. One of my specimens is in the Rhodesia Museum and the other I presented to the Albany Museum, Grahamstown.

We come now to the front-fanged or highly venomous snakes of the sub-family *Elapinæ*, which includes the cobras, mambas, garter-snakes, etc., and the family *Viperidæ*, or adders. We had only too many of these poisonous serpents at Empandeni, and they used to make life rather more exciting than was pleasant.

Of the cobras Empandeni has five or six species, the commonest being the ringhals or spitting snake, *Sepedon hæmachates*, which is very abundant throughout the district. Our Rhodesian variety is dull black in colour, with a broad salmon-tinted bar on the underside of the neck. It rarely exceeds 6 feet in length, but is very thick. At Empandeni I came across this snake times without number, but never knew it to attack unless provoked. But if molested, the ringhals stands

on the defensive at once, and it will sometimes rush at the person who is trying to kill it. It can eject its venom to a distance of several feet, and dogs are sometimes completely blinded by it. One day somebody went to get an article out of our lumber room. There was a lot of wood on the floor, and a young ringhals that was lying concealed beneath it suddenly made its presence known by spitting in that person's eyes. This caused intense pain and considerable inflammation, but fortunately no more serious results. After killing these snakes with a stick, I have more than once found some of the venom on my right hand. One day while I was at Empandeni a native put his hand down a rabbit-hole thinking there was a hare inside. The hole had an occupant, but it was a large ringhals, not a hare, and the man was bitten twice in the arm. We did everything possible for him, and his life was saved; but the whole body swelled up enormously, and the unfortunate fellow nearly died. As it was, he was very ill for weeks.

The banded cobra, which the natives about Plumtree call *Ifungaule*, and the Matabele farther north style *Iloge*, is also common at Empandeni. This snake is known to most people in Rhodesia, and many are aware of its propensity for entering fowl-houses at night and killing the chickens. It will slay half a dozen in a minute, and if allowed to remain inside, it may kill a great number before it leaves. I saw three or four of these banded cobras at Empandeni, one of which entered my room after dark, and another we killed in the fowl-house. The snake is much handsomer than the ordinary ringhals, its entire body being ringed with alternate black and salmon bands. It is considered by scientists to be merely a variety of the ringhals; but this seems surprising, for its habits, as far as I have noticed, are not the same as those of the latter snake. The banded cobra is much the fiercer and more dreaded of the two, and it also attains a considerably larger size. White policemen and natives have often assured me that specimens of from 10 to 12 feet long are sometimes seen, and that this snake will, even when unmolested, occasionally pursue people, a thing the *Ipimpi* never does. Furthermore, the banded cobra is nocturnal in its habits, whereas the ringhals is often seen in the daytime. A native once told me, and apparently he was not joking, that he one day saw a huge banded cobra coming towards him, and that "it sounded like a motor car coming along!"

The black-necked cobra, *Naia nigricollis*, is also a fairly common snake at Empandeni and its neighbourhood. The specimens I saw there were ochreous yellow in colour, with two black bands on the under side of the neck, and none of them exceeded 4 feet in length. But one day the boys killed and brought me a very handsome cobra, bronze black, and over 5 feet long. This may have been a full-grown specimen of *nigricollis*, but unfortunately I was unable to preserve it.

Another large member of the cobra family, known as Anchieta's cobra, was also found in our district, but very rarely. The only specimen I saw there looked very like a big ringhals, but it had no trace of the bar under the neck.

Probably the rarest of the Empandeni cobras, and one for which no native could give me a name, is an olive green species with a dark

blue head, and of this snake I only met a single specimen in seven years. Before I killed it, the snake put out its hood as only cobras can do. The Curator of the Bulawayo Museum and other scientists learned in snakes were unable to recognise this cobra from my description, which shews that it is a very rare, if not unknown, species. Any specimen that may be seen and killed should be carefully preserved in spirit and sent to a museum.

The largest and most formidable of the venomous snakes of Rhodesia is known to the Matabele as *Iginyambila* and to the Mashonas as *Rovambira*, *i.e.*, "the striker of rock-rabbits." This snake, which I believe to be a cobra, seems to be very little known to white settlers throughout the country, probably because it lives among the hills and rarely descends into the plains. Its ordinary food is, according to natives, the rock-rabbit or dassie; hence the Sindebele name for the snake, which signifies "it swallows rock-rabbits." While at Empandeni I frequently heard of a monstrous black cobra that lived in the hills, and was more dreaded by the people than any other snake, but it was three years before I had the good fortune to set eyes on one. I came across it after a heavy rain in the beginning of December. The snake was under a large tree, and was undoubtedly a fearful-looking creature, quite 15 feet long, and as thick as the forearm of a man, its colour being shining black. Desirous of ascertaining whether it was a cobra, I threw a stone at it. The creature instantly reared up some 5 feet high, and flattened its neck as a cobra does when angered, its aspect being truly terrifying. So I have reason to believe the *Iginyambila* is really a cobra, and if so it is about the largest cobra in the world.

The only other specimen of this snake that I met was a young one about 6 feet in length. It was lying close to a pool of water, into which it dived on my approach, emerging a few seconds later some distance down stream and then gliding into the bushes. The snake is evidently rare in the district. Many natives whom I questioned had never seen it; but all of them held it in great awe, and many declared that a man could not hope to kill it without a shot gun. Among the hills in the Umvuma and Victoria districts the *Rovambira*, as it is called by the Makaranga, seems to be commoner. Both the natives of those districts and the Matabele agree in saying that its bite is certain and speedy death, and all of whom I made enquiries declared to me that it is only found among rocky hills where rock-rabbits abound.

One of the most curious and quick-tempered of the Empandeni snakes is the shield snake, *Aspidelaps scutatus*, often, though erroneously, styled night adder by colonists. In general appearance it is very like a viper, but it belongs to the elapinæ or cobra family. Its average length is about 2 feet; the body is thick and the tail short and stumpy. In colour the snake is brick red, the head and underside of the neck being glossy black. The shield snake, or *Isipakupaku* as the Matabele call it, is a funny little creature, very poisonous, but not particularly dangerous, as it nearly always gives warning of its presence by hissing loudly. The natives are very much afraid of this irascible little serpent, for it comes out at dusk, and there is always

a possibility of treading upon it if one walks about quickly in the dark. Though quicker than the puff adder in its movements, it can be easily overtaken and despatched, and a considerable amount of amusement may be got by pursuing it with a long stick and rousing its ire. The little snake will then leap about vigorously and hiss just like an angry cat.

Of true vipers, the puff adder and night adder are found in the Plumtree district, the former in considerable numbers, the latter much more rarely, and natives informed me that the pretty horned adder, *Bitis cornuta*, known to occur near Bulawayo, is also found at Empandeni; but I never saw one during my stay there. The puff adder they call *Ibululu* (the Mashonas call it *Chiva*), and their name for the horned adder is *Ihlangwana*. Puff adders were very common at Empandeni while I was there, and we often saw them close to the house or in native kraals. The Rhodesian variety of the snake is much lighter in colour than the form found farther south, the body being light brown with zigzag markings of a darker tint. I suppose everybody knows that the puff adder moves very sluggishly except when it strikes at an object. It will remain for a long time on a spot absolutely motionless and apparently fast asleep, and this makes the snake a particularly dangerous one, since it is quite possible to approach or even to tread upon one without perceiving it. I have several times been within an ace of doing this, and know somebody who actually did it. He took a tremendous leap; so did the snake.

I may mention here that among the Matabele, as also among the Zulus, there is a widespread belief that the spirits of the dead pass into snakes, especially into the puff adder. For this reason, when a child becomes ill, the mother or some other woman asks it, "Have you seen a snake?" the idea being that, as the spirits reside in snakes, the child has probably been bewitched by an *idhlozi*. I remember an old woman who was put into a state of great alarm because somebody had killed a large puff adder that had crawled into her village and was lying close to her hut. The old dame would not have had it touched for the world, for was it not the *idhlozi* (spirit) of her uncle who had come to pay her a visit?

A poisonous snake may glide into a hut, and it will not be molested if it has entered quietly without betraying any sign of alarm. It usually conceals itself among the pots and baskets on the ground at that part of the hut opposite the doorway, and the people throw some grains of corn towards it, saying, "Here is your corn; take it and eat." Asked why they did this, one said to me, "Because it is the *idhlozi* of our people, and it is hungry." This belief that the spirits of the dead are liable to suffer from hunger or thirst is the reason why a small calabash of beer is always buried with the corpse. But if a snake enters a hut quickly and hisses on perceiving the inmates, then they say, "*Yinyoka kodwa*—it is merely a snake," and it is despatched. When in doubt as to whether a serpent is an *idhlozi* or not, these foolish people send for a diviner to "throw the bones" and tell them.

No snakes are more dreaded than the black and green mambas, especially the former, and many a blood-curdling story has been told

of the almost instantaneous deaths caused by the bites of these terrible serpents. The black mamba is said to take up a position in trees overhanging a pathway, and lie in wait for passers-by and bite them on the head or neck. Many have also asserted that it will, especially in the breeding season, pursue people without having received any provocation. The mamba is wonderfully swift, and its bite usually means death within a few minutes unless the proper remedies are applied immediately.

The black mamba (*Dendraspis angusticeps*), called by the Matabele *Imamba*, is not very common in the Plumtree district, but it is seen every now and then, and all the people dread it. During my residence at Empandeni I encountered and helped to kill three of these snakes, and I am inclined to think that in this country the snake is not so formidable as in Natal. The first I saw was 8 feet 2 inches long, and was in a large tree quite close to the house. A number of children were about at the time, and we had no difficulty in killing the snake, a boy cleverly disabling it and bringing it to the ground with a knobkerrie. A year later we saw a second specimen, also in a tree near the house. It was a young one, only 4 feet long, and we amused ourselves with throwing sticks and stones at it till we brought it down. My third encounter with one of these snakes occurred a little later, and was much more exciting. I was rambling in the thick bush close to a small river, when I almost walked into a huge black mamba lying on one of the lower branches of a large acacia tree. The snake could have bitten me easily, for it must have seen me before being perceived; but it remained perfectly still until I started back with an exclamation of alarm, when it glided swiftly to the top of the tree. Prudence might have prompted me to leave it alone; but we didn't care to have such unpleasant creatures in the vicinity, so I seized a large stone and flung it at the snake. The mamba came at me like a shot, and would probably have tried to bite had it not seen my uplifted stick, upon which it turned back and again darted up the tree. I threw some more stones at it, but without effect. The snake remained aloft, though it bit viciously at the stones as they whizzed past. It is very tiring to fling stones at an object on a high tree, especially when the sun is blazing fiercely. I soon gave up, and ran home for assistance, returning quickly with over a dozen boys. We found the mamba still perched aloft, and it was at once saluted with a shower of knobkerries and sticks. As before, it made a dash down the tree, but I headed it back, and it then remained above for three-quarters of an hour, during which time it was subjected to an unceasing bombardment. Although protected by many thorny branches of the tree, the snake was hit repeatedly, and at last its strength gave out and it fell to the ground. It measured just on 9 feet in length, and was unusually thick for a mamba. On skinning it I found seventeen wounds or bruises on the body where it had been struck by stick or stone.

One often hears people say that they have seen a mamba, when the snake they met was only a black cobra. The two snakes are very different in appearance, the mamba being much the more slender of the two, and having a very much smaller head; the body is black above and white or yellowish white on the underside.

The green mamba, a variety of the above, is called *Indhlondhlo* by the Matabele, and is very rare in the Plumtree district. It is a beautiful snake, bright grass green in colour, and quick in its movements. The only specimen I have seen measured 5 feet in length, and report says that the snake is never much longer than this.

Besides the species enumerated above, I know of one more front-fanged snake at Empandeni, a pretty little garter snake which the natives call *Imbula*.

Pythons are seen every now and then in the district, and they sometimes attain a very large size. While I was at Empandeni a friend of mine came across one of these monsters in the veld. He was too frightened to approach it, but the snake must have been a very large one, for on his return home he declared that "it would fill two Scotch carts!" However, this gentleman stated that he once had a temperature of 118 degrees when suffering from an attack of malaria, so it is possible that his python was not so big as he estimated. Natives of the Plumtree district are very fond of the flesh of the python, and they have, according to their own account, a curious way of catching and killing the snake. When one of these reptiles is seen, three or more men creep up to it quietly, each carrying a knobkerrie in one hand and a pointed stake in the other. One of the party makes his way cautiously to the head of the serpent, the second takes his stand near the middle of its body, and the third stands close to its tail. Then the three gently tickle the snake with their left hand, and on a sudden simultaneously drive their stakes into its body and pin it to the ground. This sounds like a yarn, and I must confess that I have never seen the operation performed. But a good number of natives described it to me, and all are agreed in their account.

Of the harmless little blind snakes, I saw three kinds at Empandeni, one of which, a dull yellow species mottled with black, was nearly 2 feet long. This, and a rather smaller kind, the natives called *Inyoka yomhlaba*, *i.e.*, "the ground snake," probably from its habit of burrowing into the ground. The pretty little silver snake was known to them as *Usungulo*. These blind snakes are blunt-tailed, and have a very small mouth; hence the tail end looks much like the head, and the natives, and some Europeans also, imagine that they have two heads, a belief strengthened by the fact that they can glide backwards as well as forwards.

VI. PSYCHIDÆ, OR CASE WEAVERS.

By Miss B. C. Chamberlain, Shangani.

The case weaver is an ingenious caterpillar which makes its dwelling of pieces of stick or grass woven together by a web-like substance secreted in its own body. As soon as the baby caterpillar is hatched

from the egg it begins to form its case, and does not eat till the case is completed. It moults several times before attaining its full size. It lives in its neat case-shaped abode, and moves about like a snail, carrying its home with it, which is its protection from enemies. The natives of Matabeleland call the little creature *umahambanendhlwana*, *i.e.*, "the thing that goes about with its little house."

When this caterpillar is fully matured it deserts its temporary shelter of sticks or grass and seeks a suitable place, where it fastens itself by one end to a support by a thread which it spins round its body, and then forms a hard outer surface called a cocoon. After discarding its former skin, it changes into a chrysalis, and in this stage of its existence we would not imagine it to be a living creature, as it shews no external signs of life. When the warm weather comes the chrysalis changes into a moth, and when the change is completed, the male or perfect insect creeps forth. The females, which are wingless and sometimes destitute of legs, never leave their cases.

The wings of the male moth at first are very soft and tender, but gradually after a few hours they become hard, and the moth is able to fly. The antennæ are most important to a moth, as they are the seat of highest sensibility.

The female moth is, as I have said, entirely without wings and antennæ, and sometimes without legs. This moth, like butterflies and bees, assists in the proper fertilisation of flowers, carrying pollen from the stamens of one flower to the stigma of another.

The most common species of Psychidæ are to be found on acacia trees, and they form their homes of numbers of thorns woven together, the cases closely resembling a bundle of thorns, and one would not think from casual observation that these bundles protected a living creature.

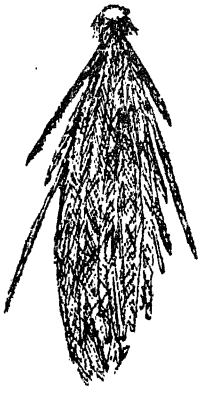
Another species makes its home of a tuft of grass tightly fastened together, and attaches itself to the growing grass, where it is seldom detected.

The accompanying illustrations may give an idea of the case weaver, its home, cocoon and the perfect insect.

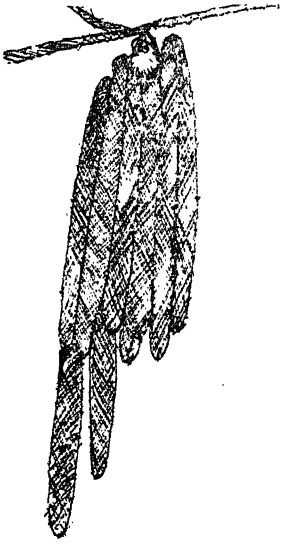
Some people are under the impression that the case-weaving caterpillar is a deadly foe to stock. I was of the same opinion until recently, and even encouraged my pupils to collect as many case weavers as possible, and I emphasised the fact that by destroying every specimen they would be assisting the farming community. This strongly appealed to them, and large tins of the insects were captured by the little enthusiasts and brought to school.

Being very interested in these curious little case weavers, I began to think it remarkable that, although they were so abundant in this vicinity, no deaths of cattle had resulted. Consequently I concluded that there was error about the charge against the case weavers.

I therefore wrote to a scientific friend in Capetown, who made definite enquiries into cases which had been reported, where cattle had succumbed from eating the supposed fatal caterpillars, but he could not discover the slightest confirmation of the charge laid against the caterpillar.



Psychidæ or
Case weaver's
Grass Home



Case weaver's
Stick Home



Case weaver's
Mimosa Thorn
Home



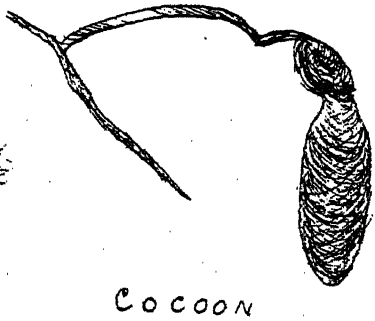
Case weaver



Mimosa Thorn
Case Weavers Cocoon



Cocoon



Cocoon



Numbers of these insects have been experimented on in Salisbury too, and the animals which were fed on them all survived, which proves that the popular idea that they are poisonous is erroneous and a myth.

I have collected a few of each of the three different species found in Southern Rhodesia to study their life history, which is somewhat difficult, owing to the caterpillar refusing to feed in captivity. However, I managed to secure some which were ready to change into chrysalids, and the following illustrations shew the different cocoons and homes made by the three kinds.

I. The soft hairy cocoon is made by the grass case weaver.

II. The bag-shaped cocoon is formed by the stick case weaver, which hangs suspended near dry leaves on a twig.

III. The hard knob-like cocoon is made by the acacia thorn case weaver.

I trust the life history of the Psychidæ will bring these insects into favour, and dispel the fears of their death-dealing qualities.

Boys and girls will find collecting these insects and others, for which there is abundant scope in sunny Rhodesia, a very entertaining study.

Enkeldoorn Produce Express Syndicate.

PREFACE TO RULES.

The syndicate has been formed for the purpose of economically running a regular light transport service between Ngezi and Umvuma, adapted to carry perishables and small produce expeditiously, with a view to facilitate the marketing of the same by its members. It consists of (1) foundation members, to whom all the properties belong, and who are jointly liable for all its liabilities; and (2) ordinary members, who pay an entrance fee of four guineas, and have the benefit of members' rates, deliberating and voting at meetings, and are eligible for holding any office. Ordinary members may become foundation members by payment of a fee of ten guineas, or other sum fixed by an annual meeting.

RULES AND REGULATIONS.

1. The financial year shall be from 1st January to 31st December.

2. Members shall consist of foundation members and ordinary members. Anyone wishing to become an ordinary member may do so by signing the members' roll. Such signatures shall be witnessed by at least one person, and shall be held to be conclusive evidence of the member's undertaking to assist in carrying out to the best of his ability the objects set forth in and to abide by these rules and regulations. They shall pay an entrance fee of four guineas, which shall be counted as income, and have the right to member's rates, deliberating and voting at meetings, and be eligible for holding any office, and shall not be responsible for any of the syndicate's liabilities.

3. An ordinary member may become a foundation member on payment of a sum of ten guineas, which shall be credited to capital account, or such other sum as may be determined by the annual meeting, but not less than the value of a share as determined by the balance sheet adopted by such annual meeting, provided that all such member's liabilities to the syndicate have been paid.

4. The widow or legal representative of a deceased member, or nominee of such member, may become a member and take over the deceased's rights, privileges and obligations. When a member nominates an individual whom he intends to succeed to his membership rights, he shall intimate the same to the secretary, who shall acknowledge receipt, and record the nomination in the roll book.

5. Any foundation member desiring to sell or surrender his rights in the syndicate shall give the directors the first option of purchasing the same.

MANAGEMENT.

6. The business of the syndicate shall be managed in accordance with these rules and regulations, and subject to any instructions or restrictions imposed by any general meeting, by a board of eight directors, elected at the annual meeting, three of whom shall represent the members north of the Umniati River, two the members between the Umniati and including Veeplaats, and three the members between there and Umvuma.

7. The board shall meet as often as may be necessary for the transaction of the business of the syndicate, and at any place most convenient to the majority. Four directors shall form a quorum at any meeting of the board duly called. A notice calling a meeting of the board shall be posted to each director at least eight days before the date of meeting.

8. The directors shall report and account for all their transactions at each statutory or general meeting, when called upon to do so.

9. The directors shall be honorary. Subject to his compliance with the provisions of these regulations, no director shall be held liable to the syndicate for any loss it may sustain unless the loss was due to his wilful misconduct, or gross negligence, admitted, or proved in a court of law.

10. The directors shall at their first meeting appoint one of their number to be chairman, and another who may sign cheques in the absence of the chairman for more than one week. If any vacancy occurs

during the year it shall be filled as soon as a meeting of the board can be convened, and reported to the first general meeting for approval.

11. The directors shall hold office till their successors have been appointed.

12. At all meetings the chairman shall have a deliberative and in case of parity a casting vote.

13. The directors shall engage a sufficient staff to carry on the work of the syndicate, fix their salaries, and determine the work to be carried out by the employees. They have also the right of suspension and dismissal.

14. The secretary shall receive all moneys on behalf of the syndicate, and lodge what is not required for cash payments into the syndicate's account with the Standard Bank of South Africa, Limited, Umvuma branch. The secretary shall not have more than twenty pounds on hand without lodging in bank as soon as possible. All cheques must be signed by the chairman, or in his absence by one other director appointed as above, and countersigned by the secretary.

15. The secretary shall give security for his intromissions to the satisfaction of the directors.

16. The directors shall cause to be kept proper accounts of all the transactions of the syndicate, and shall be responsible for the care of all the property of the syndicate. It shall be the duty of every member to report at once to the secretary or any director any neglect, misuse or abuse of any property of the syndicate which comes to their knowledge.

17. Any member of the syndicate shall have the right to attend any meeting of the directors in order to bring forward any special matter or grievance.

MEETINGS.

18. At any general meeting, except one called to consider the dissolution of the syndicate, sixteen members shall be a quorum. Each year a general meeting shall be held on the last Saturday of June, at which the directors shall report on the general business and financial position of the syndicate. It may discuss any competent business, and shall appoint a competent auditor, and fix his remuneration to audit the accounts of the syndicate before the annual general meeting, which shall be held on the last Saturday of January.

19. The directors shall present to the annual meeting a statement of accounts and a balance sheet duly audited, shewing the position of the syndicate as at 31st December preceding. Due allowance shall be made for reasonable depreciation on working plant.

20. Any net profit disclosed shall be allocated, one-half to capital account and one-half to be applied as the general meeting may direct, but the reduction of tariff rates to members shall have the first consideration.

21. The board, or any three directors jointly signing the notice, may convene a special general meeting of the syndicate when such a meeting appears necessary in the interests of the syndicate.

22. The board shall convene a special general meeting on receiving a requisition stating the business for which the meeting is desired, and signed by twelve members of the syndicate.

23. Notices shall be posted to all members of the syndicate of the date of any general meeting not less than two weeks before the date of such meeting.

24. All the assets of the syndicate of whatsoever nature are the property of the foundation members, who are jointly and severally liable for all the just and lawful debts of the syndicate, and the carrying out of its engagements. When additional permanent vehicles or power be required exceeding fifty pounds, they shall be obtained as a general meeting may determine.

25. Emergencies must be met by the directors and officials as circumstances require.

26. If oxen require to be hired for any period more than one month, they shall be so, in pairs, for periods not exceeding six months, at a rate to be fixed by the directors. The members nearest to the stage where the oxen are required are to have the first option of hiring such oxen in pairs by rotation, *i.e.*, no member may hire more than one pair of oxen to the syndicate till the next nearest member in rotation gets an option of hiring one pair at the fixed rate.

27. All oxen hired by the syndicate shall be at least three years old, trained, and, in the opinion of the board or one of their number whom they may appoint, fit and suitable for the work required.

28. All oxen shall be valued at the time of hiring at not more than an amount fixed by the board.

29. Oxen hired by the syndicate and in its charge shall be at the risk of the syndicate in all cases, except that if any of the oxen, while in the charge of the syndicate, shall, owing to the outbreak of any epizootic disease scheduled in the Animals Diseases Ordinance No. 9 of 1904, die, suffer damage, or be detained under the provision of any Government regulation, the owner of the oxen shall bear the whole of any loss that may thereby be sustained.

30. The directors shall maintain a regular and expeditious service throughout the whole route. They shall determine the route, which may be altered as the exigencies of the service and existing contracts may necessitate.

31. The directors shall appoint collecting agents, and shall arrange collecting stations to which goods may be sent for forwarding, and at which goods may be set down to be called for. Goods may be taken up at any place on the transport route, if at the same time a note of directions to the secretary be handed to the driver, and they will be booked as from the nearest collecting station, and will be at the owner's risk until so booked, or after being set down.

32. The syndicate shall not be liable for any loss sustained by any member through unavoidable delay caused by weather, flood or other dispensation of Providence.

33. The directors shall make arrangements at Umvuma for forwarding all goods carried by the transport. No goods shall be delivered to any person other than members or the appointed forwarding or collecting agents.

34. The directors shall arrange tariffs of charges for members and for non-members, which may be altered from time to time by the board as may become necessary in order to secure a sufficient income to meet the liabilities of the syndicate. When any tariff is changed the secretary shall send a copy of the new scale to every member.

35. All accounts shall be rendered monthly, and the directors shall have the right to refuse to carry goods for any person whose account remains unpaid at the end of the month following the one in which it has been rendered.

36. Foundation members whose accounts are more than three months in arrears at 31st December in any year shall become ordinary members, and the surplus, if any, of the value of their share in the net capital shall be credited to their account against any future charges.

37. Ordinary members whose accounts are more than three months in arrears at 31st December in any year shall cease to be members of the syndicate, and shall not be eligible for re-admission as new members till after the lapse of one year; but any member losing his status through arrears may be reinstated at the first annual meeting if all his arrears *plus ten per cent. thereon* are paid at or before the annual meeting.

38. The directors shall fix a limit to the load which may be put on the wagon on any section of the route, and if any member, forwarding or receiving agent shall place goods on the wagon in excess of the allotted weight or space for that section, and any damage or loss to the syndicate shall result therefrom, the person who loaded the goods shall make good any such loss. Customers desiring to load a greater weight must give the secretary eight days' notice, so that arrangements may be made if possible, but the directors are not bound in any way to provide transport for exceptional weights or space.

39. Should circumstances arise, *e.g.*, the extension of the railway, that the services of the syndicate are no longer required, the syndicate may be dissolved by a general meeting of the foundation members and board of directors called for that purpose, at which three-fourths of said members shall form a quorum, and three-fourths of whom shall consent to the dissolution of the syndicate. In the event of the dissolution of the syndicate being decided on, the directors shall prepare a balance sheet, and a committee, appointed by the foundation members, shall take steps to discharge all its liabilities, realise its assets, and equitably divide the same among the foundation members, less such sum as such members may be liable for to the syndicate.

40. These rules and regulations may be altered or amended only at an annual meeting, and any proposed alteration or amendment must be in the secretary's hands in writing three months before the date of the annual meeting, and must be duly intimated to the members on the notice calling such meeting.

Notes from a Lecture on Malaria and Blackwater.

By A. M. Fleming, C.M.G., M.B., C.M., F.R.C.S.E., D.P.H., Medical Director.

By special request, I have come here to-day to speak to you on the subject of malaria and blackwater, and to point out to you how it is within your own power to prevent these diseases amongst yourselves if you will put into practice those preventive measures which science has shewn to be absolutely essential for the protection of the health of the inhabitants of malarial countries. I am aware that what is exercising your minds most is the continuance of blackwater amongst you, and it has been suggested, in all ignorance I believe, that this is a new disease, for which there is no present remedy. Now, there is no reason to suppose that we are dealing with any other disease than the ordinary blackwater, which, as a complication of malaria, has been known to exist in Southern Rhodesia since the occupation. Blackwater fever in Europeans has always been in direct relation to the malarial incidence of a district, and when we have in addition a large proportion of the local population consisting of farmers, traders, prospectors and miners, who in pursuit of their avocations are daily exposed during the fever season to risk of infection, and who, in spite of all the warnings and advice tendered to them, pay little attention to their bodily health or to the prevention of disease, then we have two factors which must of necessity raise the blackwater incidence in such districts.

Causes of Malaria.—In order that you should understand thoroughly what the causes of blackwater and malarial fever are, and how they can be prevented, it is necessary I should give a short description of the cause of malaria and how blackwater fever may follow on it, but I will make my remarks as simple and understandable as possible. Malaria as a disease has been known and described from time immemorial. Long ago it was recognised that it was associated with residence in or near low-lying marshy ground or slow running streams, and was for centuries ascribed to miasmas or marsh exhalations arising from water-logged areas, as the result of decomposing vegetable matter. These mists or miasmas were supposed to contain some poison, the breathing in of which infected men. In 1880 a French professor discovered that in the blood of persons suffering from malaria there were invariably to be found minute organisms in the corpuscles of the blood. These organisms gradually grew in size, and sub-divided into numerous little particles or spores. The corpuscles burst, and these little particles were poured out into the blood streams and found their



Homestead of Mr. A. H. Day, Sable Range, Marandellas.



Young stock on Sable Range Farm, Marandellas.

way into other corpuscles, where they went through the same process. Further, he shewed that the various stages of shakes, high temperature and sweating, so well known, were coincident with the growth and the breaking up of these organisms in each successive cycle. So far so good, but the difficulty now was to find out how these organisms got into the blood. In 1893, that is 13 years later, two Americans shewed that the organism which caused redwater in cattle was carried by a special tick, and Sir Patrick Manson, who is now Medical Adviser to the Colonial Office in England, suggested that in the case of malaria the organism might be carried by some variety of mosquito. Major Ronald Ross, working in India, took this up, and was able to prove in a very short time that the mosquito theory was correct, and that the malarial parasite was taken up by the kind of mosquito known as anopheles, and in the mosquito's body went through various changes, and when mature was injected with the saliva into healthy persons. The exact process through which the parasite passes in the body of the mosquito I will not trouble you with a description of; this will be found in the pamphlets which have been issued from time to time by the Government.

In order to prove this, numerous experiments were carried out, but it will be sufficient if I give you two. Doctors Sambon and Low went to one of the most malarious parts of Italy during three of the most unhealthy months of the year, and to a spot so infected with malaria that no one living there under ordinary conditions ever escapes the disease. They protected themselves by living in mosquito-proof houses, and were careful never to be bitten by a mosquito, the result being that neither of them was infected, though the inhabitants around were scourged with fever. Again, some mosquitoes were allowed to feed on the blood of a person suffering from malaria in Italy. These mosquitoes were then brought to England and allowed to feed on two healthy persons who had never been in a malarial country in their lives, the result being that both had an attack of malaria. We have numerous instances in our own country of the same thing. Dr. Eaton, of Hartley, lived for many years in a mosquito-proof house with his wife and children and their nurse, and during the whole period of his residence there none of them had malaria, whilst almost every other person in the district had two or three attacks. The result of the anti-malarial crusade in the Panama zone, undertaken by the Americans under the direction of Colonel Gorgas, has abundantly proved what can be attained by systematic effort to prevent malaria, and now a region, which for centuries was recognised as one of the most pestilential spots in the world, has been converted into a country where white men, women and children can live and enjoy comparative health.

About Blackwater.—So much for the cause of malaria. Now what is the cause of blackwater fever? But first let me explain what blackwater fever really is. Blackwater fever is merely an indication of the wholesale destruction of blood corpuscles. The red colouring matter of the blood which is set free is deposited in the skin, which causes the yellow or jaundiced look, and is passed out by the kidneys, giving the red or black colour to the urine. It is generally accepted

to-day that the actual cause of this is the collection in or the sudden liberation into the blood stream of certain poisons resulting from the gradual or sudden destruction of malarial parasites, the actual attack being generally brought on by some predisposing cause, such as strain, chill, over-exertion or great fatigue. You cannot get blackwater fever without malaria, so in order to safeguard yourselves against blackwater you must avoid malaria. I trust this point is sufficiently clear to you: *To prevent blackwater you must avoid malaria.* But how is malaria to be avoided? Four methods have been laid down:—

1. By the extermination of malarial parasites by quinine.
2. By the extermination of mosquitoes.
3. By the protection of healthy persons from the bites of mosquitoes.
4. By the isolation of malaria patients so as to prevent them from affecting mosquitoes.

Theoretically, the strict observance of any one of these methods should be sufficient to prevent infection, but in practice it is impossible to ensure absolute observance in every case. Take your own cases. Many of you have to go into fields and your tobacco barns at night, and cannot adequately protect yourselves whilst at work. The same applies to the mining community, working night shifts as they do, and examples might be multiplied in each case. What, therefore, is to be aimed at is a combination of these methods, for it is by combined campaign carried out both against the parasites and against the mosquitoes that the maximum of protection will be attained. In other words, do all you can to destroy the parasite in your system, and keep down mosquitoes in and around your houses. These must go hand in hand. Sir Patrick Manson has pointed out that in actual practice complete protection may not be obtainable, but that relative protection will be followed by a relative immunity, and that as only a proportion of mosquitoes in any one place are likely to be infected, and a still smaller number of those that are infected are likely to contain the parasite at the stage in which it can affect man, therefore if some or all of the protections enumerated are carried out, the chances of acquiring infection even in highly malarial districts will be small indeed.

Methods of Protection.—Let us now consider these four methods of protection in greater detail. Firstly, the administration of quinine for the destruction of the parasite. Quinine is the one drug which has proved itself to be a direct poison to the parasite, and if taken systematically in sufficient doses by every person, should lead to the eventual extermination of the disease, by removal of the sources from which the mosquito draws its poison. In actual practice, however, it is found that it is difficult to take, with any degree of regularity, sufficiently large doses of quinine altogether to prevent an attack of malaria, in cases of severe or repeated infection. At the same time regular dosing with quinine will to a large extent prevent an attack, and what is more, will abort the fever should it occur. Dr. Aylmer May, the Principal Medical Officer in Northern Rhodesia, has wittily observed "that the future of Rhodesia lies in the quinine bottle," and in many ways he is right. As a preventive, the best method is to take 5 grains

nightly and 10 grains on Saturday night and 10 grains on Sunday night; and for a child from ½ to 3 grains nightly, according to age.

I would here like to make some remarks on that remarkable fallacy which has gained such a hold on the public mind, and which has been attributed to Professor Koch, viz., that quinine causes blackwater. Now Koch never said anything of the sort. What Koch did say was that in malarial subjects whose fever has been untreated or improperly treated, or who had been subjected to constant or repeated attacks of malaria, a sudden dose of quinine might precipitate an attack, but the best preventive of blackwater was to treat your malaria thoroughly with quinine when it occurred, and to keep on taking prophylactic or preventive doses for weeks. and it might be for months afterwards. I want you to understand that quinine in itself cannot cause blackwater fever; you might give quinine by the pound to healthy persons and it would have no such effect.

Secondly, there is the extermination of the mosquito likely to convey infection. The anopheles mosquito breeds in pools of water, irrigation furrows, running streams, water troughs, tanks, the collection of water in old tins, bottles, domestic utensils, etc. Its habitations, or living places, are in long grass, scrub, lower side of leaves, dark holes and crannies. In houses they are in the daytime found in the darkest and most inaccessible places, such as the thatch, in presses, under beds, in folds of curtains, etc. Therefore, in order to reduce these pests to a minimum in and around your house, depressions of soil where water might collect should be drained, tanks should be mosquito proof, all collections of tins, bottles, etc., should be cleared up, and duck ponds and pig wallows should be kept at least half a mile away from the house. The house itself should be well away from irrigation furrows, vleis and rivers, and, most important, all undergrowth and scrub should be cleared in the neighbourhood. By so doing away with the possible breeding places of the anopheles, and removing their means of shelter from around your house, you will at any rate materially reduce the number of mosquitoes likely to be infected or to infect you.

Thirdly, protection of individuals from mosquitoes. There are two methods recognised for the protection of the individual from mosquitoes —the use of mosquito nets and the building of mosquito-proof houses. I dismiss the use of such larvicides as eucalyptus, paraffin, etc., as being too transient in effect to be of any benefit. The chief disadvantage of nets is that they can only be used at night time, and persons are bitten and may be infected in the evening when sitting quietly reading or smoking. Still, the anopheles is a shy insect, and is rarely seen and still more rarely heard, and generally attacks when its victim is in bed and asleep, and so the religious use of the mosquito net will do much to reduce the possibility of infection. Nets should be in good repair. A net with a hole in it is worse than useless, for mosquitoes getting in cannot get out. They should be of ample size, to allow of their being tucked under the mattress all round. This is an important point, for a favourite resting place for mosquitoes is under the bed, and if the end is allowed to drop down all round, mosquitoes may be found inside the net at night. The size of the mesh should not be less than

16 squares to the inch. Possibly, however, the best method of protection is to have the house itself rendered mosquito-proof by wire gauze screens fixed to all doors and windows, or, better still, all around the verandah, where there is one. This, with a free use of mosquito nets, should give nearly complete protection. Doors and windows should have a double door of wire gauze set on strong springs, so that they automatically close, and I need hardly say that it is necessary to organise care that these screens are in proper repair, and that the lower part is so protected that dogs and other domestic animals do not tear holes in the wire gauze.

I am frequently asked, "But what is the use of these precautions, as we have no mosquitoes here?" A careful search, however, will almost invariably find them. Inyanga was always believed to be free from mosquitoes and malaria, but Dr. Hermann, when he first went to that district, was able to find at least three different varieties of anopheles in about a fortnight, and at no greater distance than half a mile from his own door. The only reason for the immunity of the persons there was that up till then these mosquitoes had not been infected. Further, the mosquito which makes its presence most felt, and at the same time is most objectionable, is the comparatively harmless culex, while the anopheles, as I have said before, is rarely seen and more rarely felt. A careful search on the window panes at dusk will often discover mosquitoes when none have been suspected.

I would here just like to say a word on the important question of housing, and the situation of houses. Houses should be situated, where possible, on gentle slopes, well away from vleis, and at least 600 yards away from water. Trees and creepers should not be planted too near, and the recommendations I have made regarding the extermination of mosquitoes should be observed. Houses may be built of brick and iron or of wood and iron, and the rooms should be lofty and well lighted, and the walls should be white-washed or colour-washed with some light colouring matter. Wattle and daub houses are an abomination, and their thatch and dark gloomy recesses provide ideal housing for mosquitoes. I am well aware that on account of cost of construction it is hard for many, and impossible for some, to provide a better description of house, but where this is so, then an attempt at any rate should be made to make them mosquito-proof by covering doors and windows with wire gauze, and by white-washing the walls, and covering the thatch with white limbo or some other light material.

Fourthly, the segregation and isolation of infected persons. This is not only a practical step, but, fortunately, also a simple one. Persons infected, or those likely to harbour infection, should always sleep under a mosquito net, and should endeavour to avoid being bitten as far as possible. A person who is harbouring malaria parasites in his body, even in the resting stage, is a danger to the community. Natives being one of the principal founts of infection, their quarters should be kept as far as possible from European dwellings.

These four methods for the prevention of malaria are not in themselves either difficult to follow or costly to practise, and yet how few pay any attention to them.

I would here like to quote you part of a letter which I received some years ago from the late Mr. W. H. Brown: "As you no doubt remember, we were greatly troubled with malaria on the farm three or four years ago. Acting on advice, I built my house mosquito-proof, and removed all natives to a location over half a mile away from the homestead, and cleared away all bottles, tin cans and other receptacles likely to bring mosquitoes, besides clearing and planting eucalyptus trees. The result is that not a single case of malaria has occurred amongst the nine or ten white people residing on the farm during the last two years."

There is no disease which holds out so many warnings to its victims as malaria, or indicates more clearly what the consequences will be of rash disregard of its advice. I say unreservedly that any man or woman who develops blackwater has in nine cases out of ten himself or herself to blame, and in cases of children, their parents or guardians are morally responsible.

A meeting of medical men from various districts was some time ago held in Salisbury, at which the subject of blackwater fever was very fully discussed, and I should like to read you the following resolution, which was unanimously passed:—

> "That in the opinion of this meeting the prevention of blackwater fever is intimately associated with that of malaria, and that every effort should be made to educate the public to the necessity for taking such precautions as will reduce their liability to malarial infections, and in consequence also of blackwater fever."

I would take this opportunity of petitioning you in the strongest terms possible to realise how important, both to yourselves, your wives and children, and to those who come after you, this vital question of malaria has become. You are settled in one of the most fertile parts of South Africa, with an ideal climate, and with the single drawback that this bogey of malaria and blackwater still stalks in the land. But the remedy lies in your own hands, and I appeal to you, both by precept and example, to remove this slur from amongst you. It is an unfortunate fact that it is only when epidemics with a high rate of mortality occur, or a time of stress arises, that a people can be aroused to the necessity of protecting their own health, and also for the necessity of spending money in this direction, and I can only hope that the fear of blackwater may have the effect of rousing the farming and mining communities to the dangers of malaria, and lead to the adoption of practical methods of protection of themselves and their families.

Twelve Simple Rules Recommended to be Practised for the Avoidance of Malaria and Blackwater.

1. See that no collections of water are allowed to remain near the house, and that all hollows in the ground or in the stumps of trees or irregularities in roof-gutters are filled in or repaired, and that water is given no means of collecting after rain, for in such collections of water mosquitoes breed.

2. See that the house is well removed from streams, vleis or marshes, irrigation furrows, dams, duck ponds and artificial collections of water —the distance being, where possible, at least half a mile—for in these mosquitoes breed.

3. See that all rain-water tanks and receptacles where water is stored for household use are protected at all openings with mosquito-proof gauze, for in these mosquitoes breed.

4. See that all long grass, bush and scrub are kept cut and cleared round the house for at least 200 yards, for in these mosquitoes shelter.

5. See that all the rooms are painted in light colours or white-washed, and thatched roofs ceiled with white calico, for mosquitoes prefer dark surfaces to rest on and light colours tend to repel them. Moreover, on light surfaces they can easily be seen.

6. See that all doors and windows are screened with mosquito-proof gauze. With a little ingenuity and the outlay of a few shillings this can easily be fixed to the openings in wattle-and-daub houses or circular huts, as well as to brick or wood-and-iron buildings. By this means the mosquito is prevented from biting you.

7. Always have mosquito-screened doors fitted with springs, so that they close of themselves, and always see that these doors are kept shut, and that the mosquito gauze on them and on the windows is in repair.

8. Always sleep under a mosquito net, for the mosquito bites most at night, when it is dark and you are quietly in bed and asleep, and even with screened doors and windows one or two mosquitoes may get in and bite you.

9. See that the huts and sleeping quarters of the native farm servants are at least a quarter of a mile from your house, for natives almost always harbour the parasites which cause malaria, and from them the mosquito largely draws the parasite which it passes on to you.

10. Never forget that persons who are suffering from malaria, or who have recently recovered from an attack, are a source of danger to others, for they contain the parasite in their blood, which the mosquito draws from them when it bites them and sucks their blood, and which it passes on to you.

11. Always take 5 grains of quinine every evening, so that the parasite may be prevented from multiplying in your blood. Small doses of quinine such as this, taken regularly, will do you no harm.

12. Never forget that malaria and blackwater are the result of infection by a little parasite which is passed into your blood through the proboscis of the anopheles mosquito when it bites you. Therefore, in order to avoid malaria and blackwater, you must firstly attack the mosquito by destroying or removing the places where it breeds and shelters; secondly, you must protect yourself from being bitten by living in a mosquito-proof house and using a mosquito net; and, thirdly, you must prevent the parasite multiplying in your blood by taking quinine.

Maize Foods for the Home

TRANSVAAL FARMERS' BULLETIN No. 1 (FIFTH EDITION).

(Reproduced by permission of the Department of Agriculture, Union of South Africa.)

Since the publication of Farmers' Bulletin No. 1 by the Transvaal Department of Agriculture, much interest has been taken in the subject of a wider use of maize in household cooking. At various agricultural shows ocular demonstrations have been given of the different ways in which maize can be prepared for the table. The results have been so successful that a new edition of the pamphlet has been called for.

These recipes are taken from various sources, chiefly of American origin.

Maize, or mealies, being the staple crop of South Africa, and grown on every farm, is the natural food of the people. In the past it was thought that "green," or as "mealie pap," were almost the only forms in which maize could be used, but America has shewn us the many dainty dishes that can be prepared from this cereal.

Several South African millers are now producing maize meal of the best quality suitable for the preparation of any of these dishes, and it is hoped that, ere long, the manufacture of a variety of locally made "breakfast foods" will make the importation of such goods unnecessary. There is an ever-increasing demand for these all over South Africa.

Each South African Government is making strenuous efforts to develop a large export trade in maize by urging increased production of selected varieties of grain, and the building up of a local demand can well be attempted at the same time.

In 1899 the United States of America exported 213,000,000 bushels of maize; in 1906, 86,000,000 bushels only: the production has not decreased, but an increase has taken place in the local demand as the result of a larger population realising the value of the product as an article of diet.

It is hoped that the housewife into whose hands these recipes fall will give them a trial, and so aid the development of one of our most important farming industries.

"Sweet or sugar corn" is not yet widely grown in South Africa, but as it is specially desirable where fresh green maize is required a small plot of it should be planted in every South African garden. Seed can be procured from any seed merchant.

The word "maize" is used in England, and the word "corn" in America, for the South African "mealie," but as maize is the term

used in the export trade it is well to employ it as much as possible. Information as to the best varieties of maize for the different districts of South Africa may be obtained from the various Departments of Agriculture.

The following recipes indicate in how many ways maize may be used for human food in addition to the already well-known "mealie meal" porridge.

PORRIDGE.

PORRIDGE.

To 2 pints of boiling water add a little salt and about ½ lb. of white maize meal which has been wet with a little cold water. Stir well to avoid lumps and set to cook slowly for an hour or more. This may be eaten with bananas, figs or dates, and cream or milk.

MAIZE MEAL PORRIDGE.

Not every one knows how to make good porridge with this meal, yet if carefully made it is dainty and appetising, and certainly in the hot weather more wholesome than oatmeal porridge. Boil one quart of water, have good fresh meal, take a handful and stir it gradually into the boiling water, continue to stir and add more meal till it is as thick as can be easily stirred; continue to stir over a gentle heat a few minutes, then let it stand about half an hour—stir occasionally. When it bubbles it will be ready to eat, hot or cold, with milk or with butter, and syrup or sugar, or with meat and gravy; the same as potatoes or rice.

FRIED PORRIDGE.

Make maize meal porridge. Turn it into bread tins, and, when cold, slice it; dip each piece in flour and fry it in lard and butter mixed in the frying-pan, turning to brown well on both sides. Must be served hot.

COLD HAM AND MAIZE MEAL PORRIDGE (FRIED).

Take bits of cold boiled ham, cut into fine pieces, put into a frying-pan with water to cover, season well. When it boils thicken with maize meal stirred in carefully, like porridge. Cook a short time, pour into a mould, when cool slice off and fry.

PANCAKES.

HOT CAKES.

INGREDIENTS.

4 *Cups sour milk.*
2 *Level teaspoonfuls bicarbonate of soda.*
1 *Tablespoonful melted butter.*
Maize meal.
Salt.

Take sour milk, add soda, a little salt, and sufficient maize meal to make a thin batter. Beat well together and fry on hot griddle (frying-pan) as pancakes.

MAIZE GRIDDLE CAKES.

INGREDIENTS.

$\frac{2}{3}$ *Quart maize meal.*
$\frac{1}{3}$ *Quart wheaten flour.*
1 *Teaspoonful moist sugar.*
$\frac{1}{2}$ *Teaspoon salt.*
2 *Teaspoonfuls (heaped) baking powder.*
2 *Eggs.*
1 *Pint milk.*

Sift together maize meal, flour, salt, sugar, baking powder; add eggs and milk, mix in smooth batter, and bake on very hot griddle to a nice brown. Serve with molasses or syrup.

MAIZE FLAP JACKS OR PANCAKES.

INGREDIENTS.

1 *Quart sour milk or buttermilk (or 4 cups).*
2 *Eggs.*
1 *Teaspoonful salt.*
2 *Teaspoonfuls bicarbonate of soda.*
2 *Tablespoonfuls golden syrup or treacle.*
1 *Tablespoonful melted lard.*
$\frac{1}{2}$ *Cup white wheaten flour.*
Maize meal.

Take milk, add eggs lightly beaten, salt, soda mixed in warm water, golden syrup, melted lard, flour, and add enough maize meal to make a thick batter. Drop a small spoonful of the batter on to a well-greased, hot frying-pan; brown on both sides and serve immediately.

MAIZE PANCAKES.

INGREDIENTS.

1 *Pint maize meal (or 2 cups).*
1 *Teaspoonful salt.*
1 *Teaspoonful bicarbonate of soda.*
4 *Eggs.*
½ *Cup wheaten flour.*
Buttermilk (about 2 cups).

Take maize meal, mix in salt and soda, and pour on enough boiling water to make a thick porridge; let it stand until cool; add the yolks of eggs, flour, stir in as much buttermilk as will make batter; beat the whites of the eggs and stir in. Fry on the top of the stove in a well-greased frying-pan.

GREEN MAIZE CAKES.

INGREDIENTS.

1 *Pint grated maize.*
3 *Cups milk.*
1 *Cup flour.*
2 *Tablespoonfuls butter.*
1 *Egg.*
Salt and pepper.

Take grated maize, add ingredients, a little salt and pepper to taste. Fry in small cakes on griddle.

WAFFLES AND MUFFINS.

GREEN MAIZE WAFFLES
(OR GRIDDLE CAKES).

INGREDIENTS.

1 *Pint green maize pulp.*
1 *Cup rich cream.*
1 *Cup flour.*
1 *Teaspoonful salt.*
6 *Eggs, beaten separately.*

Grate the maize from the cob, to this add the beaten yolks of the eggs and beat, then the cream and the flour. Put the salt into the whites of eggs before beating, and beat very stiff; add the whites just as you are ready to bake the waffles. Each waffle must be taken to the table as soon as removed from the iron. Serve with any fruit-syrup or honey.

When wanted for griddle cakes only four eggs need be used.

MAIZE MEAL AND RICE WAFFLES.

INGREDIENTS.

½ *Cup maize meal.*
½ *Cup cold boiled rice.*
2 *Eggs, well beaten.*
1 *Tablespoon melted butter.*
½ *Teaspoon soda.*
1 *Teaspoon salt.*
1 *Pint sour milk.*

Beat the mixture well before baking, adding the soda, dissolved in a little water, last of all. Grease the irons well, as with rice they are more liable to stick.

"STAMPED MEALIE" FRITTERS.

INGREDIENTS.

3 *Cups cold stamped mealies.*
1 *Cup white flour.*
3 *Eggs, well beaten.*

Beat smooth the mealies with eggs and flour, add sufficient milk to make a good batter, then add 1 teaspoonful of baking powder. Drop from a spoon into deep hot fat.

MAIZE MEAL MUFFINS.

INGREDIENTS.

½ *Pint maize meal.*
½ *Pint flour.*
2 *Teaspoonfuls baking powder.*
3 *Tablespoonfuls sugar.*
1 *Teacupful sweet milk.*
1 *Egg.*
Butter.

Take maize meal and flour, sifted with baking powder, piece of butter half as large as an egg, add egg well beaten, sugar and milk: mix well together, and bake very quickly in muffin tins well warmed beforehand.

SPONGE MAIZE MUFFINS.

INGREDIENTS.

1 *Cup of flour.*
½ *Cup of maize meal.*
½ *Teaspoonful of soda.*

$\frac{1}{3}$ *Cup of sugar.*
2 *Yolks of eggs.*
1 *White of egg.*
1 *Tablespoon of melted butter.*
1 *Cup of sour milk.*

Makes eight gems.

To use sweet milk, take 1 tablespoonful of sugar instead of $\frac{1}{3}$ cup; $1\frac{1}{4}$ cups of sweet milk instead of 1 cup sour, and 1 teaspoonful of cream of tartar.

ST. CHARLES MAIZE MUFFINS.

INGREDIENTS.

2 *Cups of white maize meal.*
1 *Cup boiling water* ($\frac{1}{2}$ *pint*).
1 *Cup of sweet milk.*
2 *Eggs.*
$\frac{1}{2}$ *Teaspoon salt.*
1 *Teaspoonful of baking powder.*
1 *Heaping tablespoonful of butter.*

Pour the boiling water over the meal and stir that all may be wet and scalded. Add the melted butter, salt and milk, then the beaten eggs.

Put the iron gem pans into the oven to heat, putting into each mould a small piece of butter or lard.

Add the baking powder to the butter and beat up thoroughly, then pour into the hot mould. Bake carefully about 20 or 25 minutes. This batter when ready will be very thin.

"CORN" MUFFINS.

INGREDIENTS.

$\frac{1}{2}$ *Pint flour.*
$\frac{1}{2}$ *Pint yellow mealie meal.*
$1\frac{1}{2}$ *Ounces sugar.*
1 *Ounce butter.*
1 *Heaping teaspoonful baking powder.*
1 *Egg.*
1 *Saltspoonful salt.*
$\frac{1}{2}$ *Pint water.*

Sift flour, salt and baking powder into a basin, add butter, rub it well into the flour, mix egg and water together, add to flour, mix to a smooth batter; butter muffin pans, nearly fill with the mixture; bake in a hot oven.

MAIZE MEAL MUFFINS.

INGREDIENTS.

1 *Coffee cup maize meal.*
½ *Coffee cup flour.*
2 *Eggs, beaten separately.*
1½ *Coffee cups sweet milk.*
1 *Teaspoonful lard.*
1 *Tablespoonful white sugar.*
1 *Teaspoonful soda.*
2 *Teaspoonfuls cream of tartar.*
1 *Teaspoonful salt.*

The last three sifted into the flour dry, and sifted again and added last before going into the oven, the whites of eggs having been beaten just before. Bake in rings or gem irons.

HOMINY MUFFINS.

INGREDIENTS.

1 *Cup boiled hominy (cold).*
2 *Cups flour.*
2 *Eggs.*
4 *Small cups milk.*
1 *Tablespoonful lard or butter.*
1 *Tablespoonful salt.*

Beat ingredients well together, and bake in quick oven in muffin tins or tin forms.

SWEET MAIZE MUFFINS.

INGREDIENTS.

1 *Heaping cupful maize meal.*
1½ *Cups flour.*
2 *Cups milk.*
2 *Tablespoonfuls butter.*
4 *Tablespoonfuls sugar.*
1 *Tablespoonful bicarbonate of soda.*
2 *Teaspoonfuls cream of tartar.*
½ *Teaspoon salt.*
3 *Eggs.*

Mix the maize meal and other dry ingredients together, except the soda and sugar, and rub the mixture through a sieve. Beat butter and sugar together until creamy, add yolks of eggs, and beat well. Beat whites to a stiff froth. Dissolve the soda in the milk and add to the sugar, butter and egg mixture. Now add the sifted dry materials, beat well, and finally stir in the whites of eggs. Put into buttered muffin tins and bake in a quick oven for about half an hour.

MAIZE GEMS.

INGREDIENTS.

1 *Pint (or 2 cups) maize meal.*
1 *Pint flour.*
1 *Teaspoonful salt.*
2 *Teaspoonfuls baking powder.*
1 *Tablespoonful lard or dripping.*
1½ *Cups milk and water mixed.*

Sift the maize meal, flour, salt and baking powder, add lard or dripping, then milk and water to make a firm batter. Bake in small muffin tins in well-heated oven for 15 minutes.

MAIZE MEAL CAKES.

INGREDIENTS

3 *Cups maize meal.*
1 *Cup flour.*
3 *Tablespoonfuls sugar.*
2 *Full teaspoonfuls baking powder.*
1 *Tablespoonful melted butter.*
3 *Cups sweet milk.*
1 *Egg.*
½ *Teaspoonful salt.*

Mix the meal, flour, sugar, salt and baking powder together in a basin, add milk, and lastly egg—without beating—and melted butter. Beat all well and bake 35 minutes in a moderately hot oven in patty pans; fill the tins only half full. Very suitable for breakfast; to be eaten with jam or butter.

MAIZE POP-OVERS

INGREDIENTS.

1 *Pint sweet milk (scalded).*
1 *Coffee cup maize meal stirred in.*
1 *Heaping teaspoon butter.*
1 *Saltspoon salt.*
3 *Eggs, well beaten separately and stirred in last.*
No soda.

Bake in gem pans.

MAIZE DODGERS.

INGREDIENTS.

3 *Cups maize meal.*
1 *Teaspoonful salt.*
1 *Tablespoonful sugar.*

Pour on boiling water enough to wet the maize well and let it stand for half an hour. Then add the other ingredients. Make into small flat cakes about an inch thick, and fry in boiling fat until brown. Twenty minutes. To be eaten very hot.

INDIAN CORN CAKES.

INGREDIENTS.

⅔ *Quart fine mealie meal.*
⅓ *Quart white flour.*
1 *Teaspoon moist sugar.*
½ *Teaspoon salt.*
2 *Heaping teaspoons baking powder.*
2 *or* 3 *Eggs.*
1 *Pint milk.*

Sift together mealie meal, flour, salt, sugar and baking powder, beat the eggs well, add to the milk, mix all together to a smooth batter. Bake in a very hot oven. Serve with jelly or syrup.

JOHNNY CAKES, ETC.

MAIZE PONE.*

INGREDIENTS.

1 *Cup maize meal.*
¼ *Teaspoon salt.*
1 *Cup water.*
1 *Tablespoonful lard.*

Rub the salt and lard into the meal, add the water and mould into a roll between the hands, flatten a little and start the baking where the top heat is greatest to prevent cracking.

NEW ENGLAND JOHNNY† CAKE.

INGREDIENTS.

1 *Pint* (2 *cups*) *maize meal.*
1 *Pint white flour.*
½ *Cup sugar.*
1 *Tablespoonful lard.*
2 *Teaspoonfuls baking powder.*
3 *Eggs.*
1½ *Pints sweet milk.*

*A kind of Johnny Cake.
†Originally known as "Journey" Cake.

Sift together maize meal, flour, sugar, salt and powder; rub in lard cold, add beaten eggs and milk; mix into firm, smooth batter, pour into shallow cake pan and bake in a rather hot oven for about 45 minutes.

SPIDER MAIZE CAKE.

INGREDIENTS.

1⅔ *Cups maize meal.*
⅓ *Cup flour.*
¼ *Cup sugar.*
¼ *Cup butter.*
1 *Cup sour milk.*
1 *Cup sweet milk.*
1 *Teaspoonful salt.*
1 *Teaspoonful (small) soda.*
2 *Eggs.*

Beat the eggs till light, add sour and sweet milk, and stir into the dry ingredients. Mix thoroughly and pour into frying-pan in which butter has been melted. Tip the pan (first) from side to side to oil evenly with the butter. Bake about half an hour on top of stove.

HOE CAKE.

INGREDIENTS.

1 *Cupful of maize meal.*
2 *Tablespoonfuls flour.*
1 *Tablespoonful sugar.*
⅓ *Teaspoonful salt.*
1 *Cupful milk.*
2 *Eggs.*

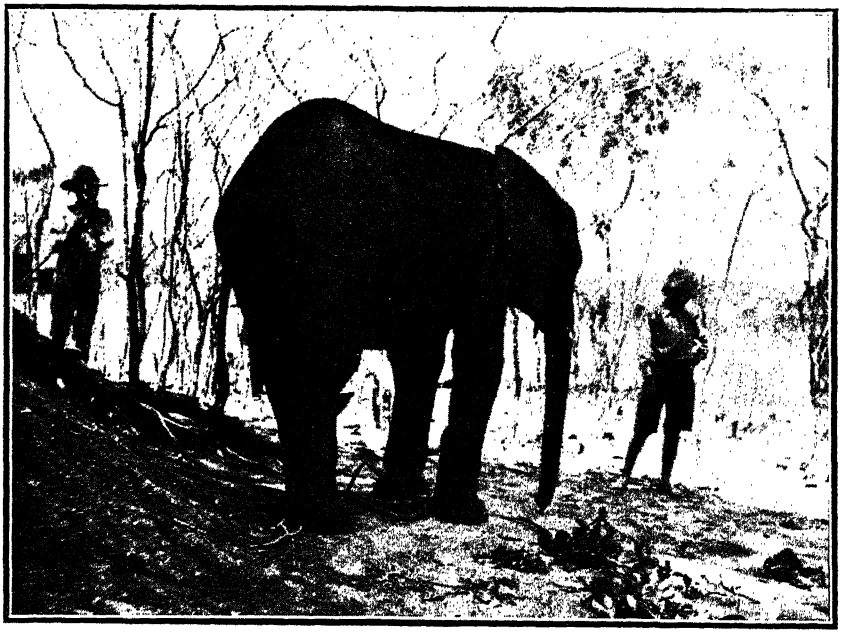
Heat the milk. Brown together in the oven the dry ingredients, add to the milk, beating until cold. Add to this the beaten yolks of eggs, and lastly fold in the whites beaten stiff. Bake for 20 minutes on hot tins, slightly oiled.

MAIZE MEAL CAKE.

INGREDIENTS.

1 *Pint sour milk.*
1 *Pint cream.*
2 *Eggs.*
1 *Teaspoonful bicarbonate of soda.*
Maize meal.

Take enough maize meal to make a thick batter, throw the salt into the meal, then stir in the milk and cream slowly, beat the eggs



A capture. Elephant hunting in Rhodesia.



A bag.

and add them; lastly put in soda dissolved in a little hot water. Bake 1 hour in shallow pans well buttered.

MAIZE CAKE (OR JOHNNY CAKE).

INGREDIENTS.

3 *Cups maize meal.*
1 *Teaspoonful salt.*
1 *Tablespoonful sugar.*
1 *Tablespoonful butter.*
1 *Egg.*

Take maize meal, salt, sugar and butter, and wet this with boiling water; then beat in egg; spread half an inch deep on buttered shallow pans, and bake brown in a quick oven. This is delicious.

STOCKBRIDGE CAKE.

INGREDIENTS.

4 *Tablespoonfuls yellow maize meal.*
1 *Pint milk.*
1 *Teaspoonful each of butter and sugar.*
¼ *Teaspoonful salt.*
3 *Eggs.*

Stir the meal into the scalding hot milk and cook till it thickens, stirring all the time. Add butter, sugar and salt, and beaten yolks of eggs, and lastly, add the well-beaten whites. Bake in deep butter pan for about half an hour.

(*To be continued.*)

Oil Factory.

The Company is prepared to receive tenders for the supply of 14,000 bags of ground nuts, to be grown during the 1917-18 season. Particulars should be furnished of the quantity and variety of the nuts offered, and the price acceptable, delivered at the Oil Factory, per bag of 80 lbs. net unshelled, or in bags of 200 lbs. shelled.

B

Tenders should be despatched in time to reach the manager of the Oil Factory, Salisbury, not later than the 15th October next, offers being acceptable from the following sources for any portion of the above-named quantity:—

(a) From individual farmers.
(b) From farmers' associations.
(c) From farmers' co-operative societies.

The Company is unable to purchase for the Oil Factory other oil seeds, such as castor beans, sunflower seed, etc., of the 1917-18 crop, but the manager of the Factory will assist growers of sunflower seed with advice as to the disposal of their crops if desired.

In submitting tenders for ground nuts, farmers must take into consideration the fact that the Company cannot continue to return a proportion of the bags when empty.

W. OLIVE,
Acting Commercial Representative.

The British South Africa Company
(Commercial Branch),
Bulawayo.

Correspondence.

BIRDS AS TICK CARRIERS.

To the Editor,
The Rhodesia Agricultural Journal.

Sir,

In the last issue of the *Agricultural Journal* appears an interesting paper by Mr. F. W. Fitz-Simons, F.Z.S., F.R.M.S., on the subject of "Birds as Tick Destroyers"; and in the same issue is printed an abridged report of the Chief Veterinary Surgeon for the year 1916. In the first paragraph under the heading "African Coast Fever" the following remarks occur: "And in the case of the Hunter's Road outbreak, the nearest infected area is about 130 miles. Direct transmission by cattle seems impossible, in view of the control exercised at all infected centres; indirect transmission, as by clothing, blankets, grass, etc., however improbable, is not impossible."

If, as stated by Mr. Sinclair, indirect transmission is not impossible by means of clothing, etc., it seems not unreasonable to suspect that the isolated outbreaks referred to, and other similar ones, have

been transmitted in some way by our feathered friends. At any rate, it seems to me that the subject is one well worthy of careful investigation, for if a true bill can be brought in, it is doubtful whether the enormous quantity of ticks stated by Mr. Fitz-Simons to be consumed by these birds outweighs the damage wrought by spreading the disease throughout the land, and so keeping the pot boiling.

I have no desire to see the wholesale destruction of birds that under normal conditions play a useful part, but it occurs to me that some means could be devised to keep them away from infected herds.

I am, etc.,

H. M. OAKLEY.

NOTE ON MR. H. M. OAKLEY'S LETTER.

By J. M. Sinclair, C.V.S.

Ticks are found on birds, but to what extent there is no reliable information. In America there is a "bird" tick found, mostly on ground-inhabiting birds, but it is somewhat remarkable that ticks are not found on our feathered game, quail, partridge, pheasant, etc., which spend the greater part of their time on the ground. Several species of ticks seem to be naturally restricted to a single genus or family of hosts. Others, although attaching to some hosts more or less frequently, have particular hosts to which they more commonly attach. From this habit has arisen some of the common tick names, such as the cattle tick, dog tick, etc.

Ticks finding themselves on unsuitable hosts drop off as a rule. How long it takes them to find out that the host is unsuitable and make up their minds to quit is a matter of conjecture, but it is doubtful if such period would cover a journey of a hundred miles by the host.

To establish an outbreak of Coast Fever through the accidental or passive agency of a bird, the following conditions must be fulfilled:—(1) The bird picks up a tick on the infected veld; (2) this tick must be capable of transmitting Coast Fever; (3) the tick must not attach itself to the temporary or accidental host, otherwise its power of transmitting the disease will be lost; (4) the tick must be carried to a clean area and there dropped, and (5) must there attach itself to an animal susceptible to Coast Fever. Knowing that ticks are not commonly found on birds and that they do not remain on unsuitable hosts, what are the chances of such a process being completed? In the first place, the total number of infected ticks on any area is a small proportion of the whole, probably not more than 5 per cent., and on this basis it is 19 to 1 against every tick carried by birds being capable of transmitting Coast Fever; but assuming that an infected tick is dropped on clean veld, it does not follow that it goes straight on to a susceptible animal and causes a fresh outbreak of Coast Fever. There are many agencies at work to prevent this, *e.g.*, other hosts such as game, vermin, horses, sheep, etc.; fire, accident, location on a spot to which cattle are not accessible; or if it does find a suitable host, it may be killed in a dipping tank before actually transmitting the disease.

Whilst the possibility of the dissemination of Coast Fever infection by ticks passively carried by birds, game, or on clothing, etc., cannot be denied, the probability is so remote in my opinion as to be negligible. If it were even rarely transmitted by such means, the whole of Africa would have been infected generations since. But assuming that there is a real danger from birds, what are we to do? We could not destroy them all, nor keep them off infected veld, nor could we bring them under the operation of the compulsory dipping regulations.

The Agricultural Outlook.

The health of live stock generally is reported as being good, with the exception that quarter-evil still exists in certain districts to the south and west. In a few sections, where surface water is becoming scarce, especially in the Midlands, stock are losing condition, but in the country as a whole they are reported to be wintering well and to be in better condition than at this time last year, while in some parts the early grazing is said to be exceptionally good.

The harvesting of maize is now practically over, and we shall shortly be able to obtain figures shewing the total yield for the country. In those districts where wheat, oats and other winter crops have been grown, reports shew that the results will be satisfactory, but it is curious to note how in some of the best arable areas the cultivation of winter crops is still largely neglected. Those districts where maize crops have been disappointing this year will shew a decreased acreage in the coming season, but this will be more than counter-balanced by the large stretches of new land being broken up in the true maize belt.

With the close of the show season and a visit to some of the principal maize growers in the Mazoe Valley, it has been possible to estimate the general quality of the maize grown in this Territory during the past season. It cannot be doubted that considerable progress has been made as a result of attention to seed selection by the farmers. One observes this chiefly in the greater uniformity shewn in the maize exhibits at the shows and in the maize dumps at the farms. Seed selection is being taken up enthusiastically by many farmers, and it is to be hoped some recognition may be obtained for our improved quality of grain in the shape of enhanced prices which may probably be obtained from the Home manufacturers requiring the best quality of grain for their products.

Veterinary Report.

July, 1917.

AFRICAN COAST FEVER.

SALISBURY DISTRICT.—No fresh outbreaks. At the infected farm Hopley one beast was destroyed.

UMTALI DISTRICT.—No fresh outbreaks. At the infected farm Engwa four head were destroyed.

MREWA, MELSETTER AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the existing centres of infection.

VICTORIA DISTRICT.—No fresh outbreaks. The following mortality occurred at the existing centres of infection:—Erichsthal, 17; Glenlivet, 4.

ANTHRAX.

Two further cases occurred on the farm Passaford, Mazoe district.

QUARTER-EVIL.

The following mortality in cattle from quarter-evil was reported:—Bulawayo, 24; Plumtree, 19; Fort Usher, 11; Inyati, 72; Insiza, 31; Umzingwane, 6; Nyamandhlovu, 45; total, 208.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 44; mules, 5; donkeys, 47.

TUBERCULIN TEST.

The following animals from the United Kingdom were tested, with negative results:—Bulls, 4; heifers, 8.

The June return is as follows, not as previously reported:—Bulls, 27; heifers, 77.

IMPORTATIONS.

Bulls, 30 (14 *ex* United Kingdom); heifers, 58 (38 *ex* United Kingdom); horses, 44; mules, 5; donkeys, 47; sheep and goats, 1,773.

EXPORTATIONS.

Slaughter oxen *via* Bulawayo, 1,119; *via* Liebig's Drift, 137; sheep and goats to Congo and Northern Rhodesia, 225; donkeys to Northern Rhodesia, 36; donkeys to Union of South Africa, 31; mules to Union of South Africa, 18; horses to Union of South Africa, 15.

August, 1917.

AFRICAN COAST FEVER.

SALISBURY DISTRICT.—No fresh outbreak. On the infected farm Hopley three head were destroyed.

UMTALI DISTRICT.—No fresh outbreaks. Five head were destroyed on the infected farm Engwa.

MREWA, MELSETTER AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease at either of the existing centres of infection.

VICTORIA DISTRICT.—No fresh outbreaks. The following mortality occurred:—Erichsthal, 3; Glenlivet, 2; Midwaters, 3.

ANTHRAX.

Two cases occurred on the farm Passaford. The cattle on this farm, also on the farms Dovedale and Pearson Settlement, have been vaccinated.

CONTAGIOUS ABORTION.

One suspected outbreak occurred in the Marandellas district.

QUARTER-EVIL.

The following mortality in cattle from quarter-evil was reported:—Plumtree, 15; Matobo, 19; Umzingwane, 4; Inyati, 161; Bulawayo, 21; Nyamandhlovu, 7; Figtree, 7; total, 234.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 85; donkeys, 26.

TUBERCULIN TEST.

Nine bulls and eight heifers *ex* United Kingdom were tested, with negative results.

IMPORTATIONS.

Bulls, 21; heifers, 60; horses, 85; donkeys, 26; sheep and goats, 1,049.

EXPORTATIONS.

Slaughter oxen, 1,304 *via* Bulawayo and 853 *via* Liebig's Drift; sheep and goats to Northern Rhodesia and Congo, 329; sheep and goats to the Union, 257; mules to the Union, 5; pigs to the Union, 72.

Correction.—In the May return, 71 head in excess was shewn; these had been included in the April return.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

October.

BEE KEEPING.

Bush bloom is now on, the queens consequently are laying vigorously, therefore give space and ventilation. In good districts, where stocks are strong, nectar may be coming in freely, and to prevent swarming it may be necessary to remove a crate of honey. By using the carbolic cloth, the operation is easily and quickly accomplished. At this season, whenever a crate of honey is removed, a properly fitted empty crate must take its place, otherwise the bees will swarm. Keep the apiary clear of weeds, and all hives well shaded. Feed any weak stocks.

CITRUS FRUITS.

Irrigation should be continued, followed by thorough cultivation, if no good soaking rains occur. From about the middle of this month to middle of next is the best time to plant orange trees, as they have hardened up their first growth, and if properly attended to will commence to grow right away, so that by the end of the growing season they will have put on considerable growth and established themselves well in the ground.

CROPS.

If ploughing has not been done earlier in the season, it should be undertaken as early as the rain will permit. A disc harrow or a roller should immediately follow the plough in order to break up the clods. In the case of new lands ploughed for the first time earlier in the season, an attempt should now be made to cross plough these. Permanent crops, such as Napier's fodder or dhal, will require but little attention, except a light harrowing between the rows to maintain the mulch. Castor beans should still be harvested as the pods ripen. It is not safe or advisable to plant any summer crops during this month. Winter wheats will be ready for harvesting, and the stubble should be ploughed in as soon afterwards as possible.

ENTOMOLOGICAL.

Maize.—Where circumstances permit the early planting of maize, cutworms and stalk borer are apt to inflict severe damage. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912.

Tobacco.—Cutworms, stem borer and leaf miner are liable to be troublesome in the seed beds. See "Handbook of Tobacco Culture," published by the Agricultural Department, pp. 71-90.

Potato.—Defoliation by caterpillars is mainly to be feared. Use an arsenical wash.

Cabbage, Turnip, etc., sometimes suffer severely from diamond back moth and webworm. Spray or dust with an arsenical compound. See "Cabbage Webworm," *Agricultural Journal*, February, 1914.

Bean.—A few traces of stem maggot may be seen, but severe injury has not been noticed as early as October. See "Bean Stem Maggot," *Agricultural Journal*, April, 1913.

Citrus Trees may be sprayed for scale after the fruit has set. Resin wash should be used for this purpose. Fumigation is still more effective.

Deciduous Fruit Trees, including grape vines, are liable to attack from chafer beetles. See "Chafer Beetles," *Agricultural Journal*, December, 1914. Early peaches are frequently attacked by fruit moths, and choice varieties should be netted to keep these away.

Fig.—Fruit infested with fig weevil should be collected and destroyed.

FLOWER GARDEN.

All flower seeds, annual and perennial, may be sown as in September. A word or two on open seed beds may not be out of place here. These beds should be prepared in a sheltered position, and the soil should be well and deeply dug. This is more essential than at first thought, as in this state the soil when once watered is more easily kept moist, and is not so liable to cake. The top dressing should be free from all undecayed vegetable matter, and when sown, the seeds should be covered with a thin dressing of fine light soil, over which a thin covering of grass may be placed to check evaporation. Transplanting from boxes or beds should be done on a dull day or towards evening; the plants should be well watered before being removed, and the roots disturbed as little as possible, care being taken that the latter have their full depth and spread when planting.

FORESTRY.

Prick out into tins any trees that are ready. If the ground is soft enough, harrow and cross-plough the land broken up in the early autumn. This is a good month for stripping wattle bark.

POULTRY.

Do not work the breeding stock too long. Early mated pens should now

be broken up. Early hatched cockerels, which should have already been separated from the pullets, should be carefully watched, with a view to selecting next year's stock birds and those for market. All houses, specially those of the young stock, should be attended to at once, if they are not weather proof. Do not attempt to rear backward and weakly chicks through the wet season; they should be killed at once.

STOCK.

Cattle.—Ranching cattle on granite veld will in many instances be in fairly good condition on account of the early grass in the vleis, etc. On the diorite soils and later veld the cattle owner will still have to watch his weaker cattle carefully. In any case all supplies of hay, ensilage, majordas, etc., should be carefully husbanded in anticipation of possible late rains, but at the same time every effort should be made to prevent cattle becoming weak. Dairymen will need to feed highly both with succulents and green foods. Calves should be weaned and branded, if this has not already been done, and care should be taken that they do not suffer any serious set-back by reason of the want of veld. If calves are not desired in mid-winter, the bulls should be taken out of the herd now until the end of January. Care should be taken to provide a plentiful supply of clean water, and dipping must be regularly attended to.

Sheep.—If spring lambs are expected, one should see that the sheep shed is in order, and that there is a supply of hay, ensilage or mealies for the poorer ewes in the case of late rains. All drinking places should be cleaned out, and care taken that the water supply is sufficient.

VEGETABLE GARDEN.

As in September, nearly all vegetable seeds may be sown. Early potatoes should be earthed up when reaching the height of about eight inches. In planting a small amount of marrow, melon, cucumber, and pumpkin, the writer has found it economical to sow the seed one in a tin and transplant when about four inches high in hills. A few cucumbers planted in this manner yielded nearly 400 a week for about two months. Sweet corn and mealies may also be sown this month.

VETERINARY.

White scour is prevalent in spring—November and December—but dipping is eradicating this disease. There is still danger from vegetable poisoning, and it will only disappear when there is plenty of good grass on the veld.

WEATHER.

This is apt to be a hot dry month, and rather trying, therefore, to man and beast, and the strong winds which blow at this season add to the general discomfort. Evaporation is, as a consequence, at its greatest at this time of year, and dams and pools lose most from this cause. The prevalence of veld fires at this time of year adds to the anxiety of the stock owner. The average rainfall in Mashonaland is from one to one-and-three-quarters of an inch; in Matabeleland one inch or so, and rather less in the Zambesi Valley. Generally speaking, the rain is more plentiful and earlier in the eastern districts, and takes the form of thunder showers at this time of year.

The rainy season has occasionally started early in October, but for practical purposes it need not be expected before the end of this month. The days are becoming warmer, and often even hot and oppressive. Clouds gradually collect, at first disappearing at sunset, but later becoming more persistent. Sheet lightning is usually frequent, and showers of gradually-increasing severity mark that the rainy season has set in. Steps should be taken in advance to provide for the run-off after such torrential rains, otherwise serious loss may result.

November.

BEE KEEPING.

Now that the first honey flow is on, be sure the hives stand level, whether working them for extracted or section honey. This is important, saving annoyance when preparing the product for market. Occasionally, where bees have not been thoroughly subdued, they object to the removal of honey; postpone the operation for 24 hours. Where increase of stocks is required, artificial swarms can now be made. Use care in storing honey.

CITRUS FRUITS.

If no appreciable rain has fallen, irrigation must still be resorted to, in order to keep the trees in good growth and not allow any check to the fruit. This is the best month to sow beans or other seeds for ploughing in later as green manure. Sow about 75 lbs. of kaffir beans per acre, so as to cover the whole area with a green covering.

CROPS.

This month is one of the busiest on the farm. All the implements should be examined and put into order, particularly the maize planter, as a great many of the misses in the maize field are undoubtedly due to faulty planting. Seeds should be overhauled, and pea nuts intended for seed are best shelled immediately before planting. Planting and sowing will commence with the rains. Among the first crops to be sown are velvet beans (for seed), pea nuts, dhal, sunflowers and maize. Napier's fodder roots may be divided for the first time if the rains will allow.

ENTOMOLOGICAL.

Maize.—The chief enemies during November are cutworms, stalk borer and surface beetles. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912. The black chafer is sometimes very injurious on damp soils, but the insect has been imperfectly studied as yet.

Tobacco.—Practically all the enemies of this crop are injurious when it is newly planted out. See "Handbook of Tobacco Culture," published by the Agricultural Department, pp. 71-90.

Potato.—The first brood of the leaf-eating ladybirds commences in November. See "Two Ladybirds injurious to Potato," *Agricultural Journal*, October, 1913. Blue blister beetles are frequently a nuisance on sandy soils, and caterpillars may be troublesome. An arsenical spray will check these pests.

Cabbage, Turnip, etc., suffer chiefly from diamond back moth and webworm, either of which may be injurious. See "Cabbage Webworm," *Agricultural Journal*, February, 1914. Dusting with paris green and lime will check the diamond back moth.

Bean may suffer from aphis, if the weather is dry. Soap wash or tobacco wash will give relief. Stem maggot is rarely serious as early as November.

Citrus Trees may be sprayed with resin wash for scale.

Deciduous Fruits.—Chafer beetles and fruit moths are the chief troubles. See "Chafer Beetles," *Agricultural Journal*, December, 1914. Netting the trees is the only known remedy for the latter.

Fig.—Fig weevil is apt to be troublesome. The infested fruit should be collected and destroyed.

FLOWER GARDEN.

All seeds may now be planted. Annuals for January flowering should be sown, amongst which the following will be found to do excellently in this country :—Balsam, Calliopsis, Centurias, Chrysanthemum, Dianthus, Eschscholtzia, Marigold, Mignonette, Gallardia, Phlox, Poppy, Nasturtium, Nigella, Verbena and Zinnia. These are all hardy, and may be sown in the open either in beds or in the position desired for flowering. Advantage should be taken of each shower of rain during this month to keep the soil well worked and loose.

FORESTRY.

Any young plants that are still in the beds should be pricked out into tins in the early part of this month. It is really rather late for this work. If the cross-ploughing and harrowing was not tackled last month, it should be done now.

POULTRY.

Do not allow young stock which has not reached the perching stage to sleep on damp litter. If there is any chance of rain driving into the house at night, some protection must be fixed up. Do not rely upon the rain to fill the water troughs. These should receive the same attention as during the dry season. Care must be taken that there is no waste of food, as, with the advent of rains, all the stock will pick up an abundance of natural food. A smaller quantity of green food may now be given, but it should not be omitted altogether.

STOCK.

Cattle.—Normally rains will have fallen and the veld will be plentiful now. Beyond careful dipping, ranchers should not have much worry. If the season is bad, the poorer cattle should be drafted out and given a little hay, ensilage or mealies daily. Dairymen will not require to feed much succulent food, and usually the more expensive protein foods may be considerably curtailed at this time, but good sweet hay and mealies will be found to be very beneficial to milch cows, even if the veld is very plentiful. Clean dry sleeping places for both cows and calves will pay handsomely for any extra trouble involved. Young calves do not need to walk far, and in wet weather are much best in a clean dry pen. Watch for ticks.

Sheep.—Keep the sheep on high dry land. Be careful to keep the ticks down. Be sure the kraal or sheep shed is dry and clean, and that there is shelter from the rain for young lambs.

TOBACCO.

Continue to sow seed beds, watering, etc. When early beds become overgrown and hard, pull out, dig up and re-sow. Begin transplanting with the first good rains, and continue as fast as the rains and planters will allow, until the crop is set out.

Be careful to fill in the misses from previous transplanting before starting on new fields; use the stoutest and best plants for filling in, and try to get the tobacco from any one field to grow and come to maturity as near at the same time as possible. Discontinue filling in when the field has been planted for several weeks, and has made a good start to grow, as the later filled in plants will be choked out by the earlier ones, and will not come to maturity.

VEGETABLE GARDEN.

All vegetable seeds may be sown during this month. Tomatoes and early peas and beans should be staked. The soil should be kept loose and free from weeds, which now get troublesome. Sow pumpkin, mealies, peas and potatoes.

VETERINARY.

Early heavy rains might bring on horse-sickness before its usual time, but as a rule it need not be feared till the first rains are over in December.

WEATHER.

The rains should be commencing, if not already begun; occasionally they have delayed until December, and even later, before setting in properly. Between spells of wet weather lasting several days, fine dry periods occur, at first clear, but later cloudy and thundery, gradually gathering to burst in thunder storms. The mornings are generally fine, and rain falls chiefly in the afternoon or evening. Heavy down pours are to be expected, and should be provided against beforehand by means of ditches and embankments, and by clearing water ways and furrows.

In an ordinary season the rainfall is from four to five inches, more in the east and less in the west and in our two great river valleys of the Zambesi and Limpopo. Before the rains commence, severe heat, trying on account of the strong winds and the dryness of the air, is likely to be experienced.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1917	July	5·89	0·29	0·16	0·19
1917	August	6·66	0·29	0·16	0·21

TEMPERATURES.

Station	July		August	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
Mashonaland—				
Charter—				
Enkeldoorn	73·0	38·3	74·9	42·5
Hartley—				
Gatooma	79·3	44·3	—	—
Hallingbury Farm	76·3	39·6	79·1	48·6
Hartley Hospital	79·0	42·0	81·9	49·3
Idaho Farm	77·0	38·4	—	—
Lomagundi—				
Eldorado Mine	76·5	38·2	82·3	59·2
Sinoia	80·4	55·5	85·0	61·0
Sipolilo	—	—	—	—
Mangwendi—				
Kwenda Hospital	69·3	53·3	—	—
Mazoe—				
Shamva Mine	77·6	42·3	—	—
Melsetter—				
Melsetter	67·8	42·6	68·7	45·3
Mount Selinda	69·0	45·1	70·0	49·4
Vermont	70·3	49·6	71·0	52·4
Salisbury—				
Chishawasha	74·3	41·4	77·1	46·0
Salisbury (Gaol)	—	—	—	—
Umtali—				
Public School	76·1	41·5	76·4	52·4
Summerfield	—	—	—	—
Victoria—				
Eythorne	69·0	39·8	71·9	45·4
Morgenster	—	—	—	—
Victoria	73·4	40·2	73·7	47·7

TEMPERATURES—*(Continued).*

Station	July		August	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	75·8	40·0	78·0	46·7
Garth	—	—	78·1	43·6
Plumtree School	—	—	—	—
Retreat	79·9	43·2	82·0	48·4
Riverbank	51·7	44·1	56·8	49·2
Bulawayo—				
Observatory	71·4	43·2	—	—
Gwanda—				
Antelope Mine	75·9	48·0	76·6	51·4
Mazunga	80·2	42·4	—	—
Tuli	78·9	39·0	78·4	51·0
Gwelo—				
Gwelo (Gaol)	74·3	41·4	74·5	46·9
Matobo—				
Holly's Hope	76·1	39·7	76·6	46·5
Rhodes Matopo Park ...	73·2	40·4	76·2	47·0
Umzingwane—				
Essexvale	77·4	45·5	78·0	44·0
Hope Fountain	—	—	73·0	46·4
Wankie—				
Victoria Falls	78·3	—	83·0	—
Wankie (Hospital)	86·4	50·3	87·7	58·0

RAINFALL.

Station	July	August
MASHONALAND—		
Charter—		
Buhera	0·60	Nil
Bushy Park	—	—
Enkeldoorn Gaol	0·02	0·09
Marshbrook	0·07	0·07
Range	Nil	0·15
Riversdale	,,	—
Umniati	,,	Nil
Vrede	0·04	—
Wylde Grove	Nil	0·01
Chibi—		
Chibi	Nil	0·10
Nuanetsi Ranche	,,	—
Chilimanzi—		
Central Estates	Nil	—
Chilimanzi	0·04	—
Driefontein	Nil	0·05
Induna Farm	,,	—

RAINFALL—*(Continued).*

Station	July	August
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	Nil	—
Umvuma (Railway)	,,	Nil
Darwin—		
Mount Darwin	Nil	—
Gutu—		
Chingombe	0·42	—
Eagle's Nest Ranche	0·08	—
Gokomere	0·15	0·15
Gutu	—	—
Hartley—		
Ardgowan	Nil	Nil
Auchter Leny	,,	—
Battlefields (Railway)	,,	Nil
Carnock Farm	0·08	0·05
Elephant Hill, Battlefields	—	—
Elvington	Nil	Nil
Gadzema (Railway)	,,	,,
Garthnor	0·02	0·03
Gatooma	Nil	Nil
Gatooma (Railway)	,,	,,
Gowerlands	0·06	,,
Hallingbury Farm	Nil	,,
Hartley Hospital	,,	,,
Hartley (Railway)	,,	,,
Hopewell	—	—
Idaho Farm	0·10	—
"Jenkinstown"	—	—
Makwiro (Railway)	Nil	—
Philiphaugh	,,	0·04
Shagari	,,	Nil
Spitzkop	,,	,,
Inyanga—		
Inyanga	Nil	0·14
St. Trias' Hill	,,	—
Lomagundi—		
Argyle	...	0·25
Banket Junction (Railway)	Nil	0·06
Darwendale	,,	—
Duxbury Farm	,,	Nil
Eldorado Mine	,,	0·22
Eldorado (Railway)	,,	—
Lion's Den	—	—
Lone Cow Estate	Nil	—
Longmead	,,	Nil
Maningwa	,,	0·23
Mikore	—	—
Palm Tree Farm	—	—
Sinoia	Nil	0·04
Sinoia (Railway)	...	Nil
Sipolilo	...	...
Umvukwe Ranche	Nil	Nil

RAINFALL—(*Continued*).

Station	July	August
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	Nil	0·05
Chimbi Source	—	—
Delta	Nil	0·22
Eagle's Nest	,,	0·13
Ellavale	—	—
Gorubi Springs	Nil	0·61
Headlands (Railway)	0·12	Nil
Mona	Nil	0·10
Monte Cassino Mission	0·08	0·03
Odzi (Railway)	Nil	0·21
Rusape (Railway)	,,	0·50
Springs	,,	0·58
York Farm	—	—
Marandellas—		
Bonongwe...	0·08	0·10
Huish Estate	0·09	0·14
Kwenda Hospital	0·10	—
Land Settlement Farm	0·07	0·02
Macheke (Railway)	0·12	Nil
Marandellas	—	—
Marandellas (Railway)	Nil	0·14
Nelson	0·16	0·16
Selous Nek	Nil	Nil
Theydon	0·11	0·23
Tweedjan	Nil	0·17
Verdoy	—	—
Mazoe—		
Avonduur	—	—
Bindura	—	—
Bindura (Railway)	Nil	Nil
Ceres	,,	,,
Chipoli	,,	,,
Citrus Estate	,,	—
Dunmaglas	—	—
Jumbo (Railway)	Nil	Nil
Kilmer	—	—
Kingston	Nil	0·03
Laguaha	—	—
Lowdale	—	—
Mazoe	—	—
Mguta Valley	—	—
Omeath	—	—
Protea Farm	Nil	—
Ruia	,,	Nil
Ruoko Ranche	—	,,
Shamva	—	—
,, Mine	Nil	—
Stanley Kop	,,	Nil
Sunnyside	,,	—
Teign	,,	Nil
Virginia	,,	—
Volynia Ranche	,,	—

RAINFALL *(Continued)*.

Station	July	August
Mashonaland—(Continued)		
Mrewa—		
Glen Somerset	Nil	Nil
Mrewa	,,	,,
Mtoko—		
Makaha	Nil	Nil
Mtoko	,,	,,
Melsetter—		
Brackenburg	0·31	1·68
Chikore	0·25	1·28
Chipinga	0·13	—
Helvetia	0·40	—
Melsetter	0·44	1·01
Mount Selinda	0·54	2·79
Mutambara Mission	0·26	0·21
Pasture	0·64	—
Tom's Hope	0·64	0·16
Vermont	0·45	—
Ndanga—		
Bikita	0·58	1·48
Chiredzi Ranche	0·35	1·59
Marah Ranche	Nil	Nil
Ndanga	0·15	0·84
Pamushana	Nil	0·51
Salisbury—		
Ardbennie	Nil	—
Avondale	,,	Nil
Botanical Experiment Station	—	—
Bromley	0·05	0·22
Brookmead	—	—
Borrowdale (Hatcliffe)	Nil	0·11
Chishawasha	0·05	0·06
Cleveland Reservoir	0·06	0·02
Ewanrigg	Nil	—
Forest Nursery	,,	0·23
Glenara	—	—
Goromonzi	0·05	0·05
Gwebi	Nil	—
Hillside	0·06	0·03
Lilfordia	Nil	—
Salisbury (Gaol)	—	—
,, (Railway)	Nil	Nil
Sebastopol	0·05	,,
Selby	—	—
Stapleford	—	—
Sunnyside	—	—
The Meadows	0·05	0·04
Vamona	0·05	0·15
Westridge	—	—
Umtali—		
Odzani	0·08	0·62
Penhalonga	0·23	1·66
Premier Estate	0·04	0·43
Public School	0·08	0·69

RAINFALL *(Continued).*

Station	July	August
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	Nil	0·03
Stralsrund	0·11	—
Summerfield	—	—
Umtali (Railway)	Nil	0·79
Utopia	—	—
Urungwe—		
Nassau Estate	Nil	—
Victoria—		
Brucehame	0·12	0·02
Clipsham	0·17	0·08
Empress Mine	Nil	—
Eythorne	0·32	0·18
Fairburn	0·18	0·15
Fort Victoria (Railway)	0·15	0·12
Marthadale	—	—
Makorsi River Ranche	0·05	0·36
Morgenster	—	—
Silver Oaks	0·13	0·12
Victoria	0·15	0·12
MATABELELAND :		
Belingwe—		
Tamba	Nil	0·66
Wedza	,,	0·85
Bubi—		
Bembesi (Railway)	Nil	Nil
Imbesu Kraal	,,	—
Inyati	,,	—
Maxim Hill	,,	—
Shangani Estates	—	—
Bulalima-Mangwe—		
Empandeni	Nil	0·50
Garth	—	0·25
Mholi (late Magot)	Nil	—
Plumtree School	—	—
Retreat	Nil	Nil
Riverbank Farm	,,	,,
Solusi Mission	,,	,,
Syringa	,,	—
Tjompanie	Nil	0·03
Bulawayo—		
Government House	—	—
Keendale	Nil	Nil
Khami	,,	0·02
Lower Rangemore	,,	—
Observatory	,,	—
Raylton (Railway)	,,	Nil
Umgusa	,,	—
Umkien	—	—
Gwanda—		
Antelope Mine	Nil	0·33
Gwanda (Gaol)	,,	0·69

RAINFALL *(Continued)*

Station	July	August
MATABELELAND —(Continued)		
Gwanda—continued		
Gwanda (Railway)	Nil	0·72
Lamulas	0·08	0·83
Langalanga	0·28	0·65
Makalali	0·36	0·81
Manantji	0·18	0·96
Mapande	0·66	0·64
Mazunga	0·20	0·86
Mtshabzi Mission	0·03	0·27
Tuli	0·22	0·24
West Nicholson (Railway)	Nil	0·50
Gwelo—		
Daisyfield	Nil	0·09
Dawn	,,	Nil
Globe and Phœnix Mine	...	...
Globe and Phœnix (Railway)	Nil	Nil
Gwelo (Gaol)	,,	,,
Gwelo (Railway)	,,	,,
Hunter's Road	,,	0·01
Lalapanzi (Railway)	,,	0·07
Lovers' Walk	—	—
Lower Gwelo	...	...
Oaklands	Nil	Nil
Rhodesdale Estate	,,	—
Sikombela Farm	,,	—
Woodendhove	—	—
Insiza—		
Albany	Nil	Nil
Filabusi	,,	0·09
Fort Rixon	,,	—
Infiningwe	,,	...
Insiza (Railway)	,,	Nil
Inyezi Farm	...	—
Orangevale	Nil	0·46
Roodekeuvel	,,	0·18
Shangani (Railway)	,,	Nil
Thornville	,,	,,
Matobo—		
Holly's Hope	Nil	0·24
Matopo Mission	,,	0·15
Rhodes Matopo Park	,,	0·09
Nyamandhlovu—		
Gwaai (Railway)	Nil	Nil
Edwaleni	,,	—
Impondemi	...	...
Melinakanda Junction	Nil	...
Naseby Farm	,,	0·01
Nyamandhlovu (Railway)	,,	Nil

RAINFALL *(Continued).*

Station	July	August
MATABELELAND—(Continued)		
Sebungwe—		
Gokwe	—	—
Inyoka	Nil	—
Selukwe—		
Hillingdon	0·14	0·37
Selukwe (Railway)	0·13	0·61
Tokwe River Ranche	0·10	1·21
Umzingwane—		
Balla Balla (Railway)	Nil	—
Crombie's	,,	—
Essexvale	,,	0·04
Heany Junction (Railway)	,,	Nil
Hope Fountain	—	—
Springs Farm	—	—
Wankie—		
Bombusi	—	—
Dett (Railway)	Nil	Nil
Malindi (Railway)	—	—
Victoria Falls	Nil	Nil
Victoria Falls (Railway)	,,	,,
Wankie Hospital	,,	,,
Wankie (Railway)	,,	,,

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917		
			October	November	December
Beatrice Road	Various farmhouses	H. W. Harris	10	14	12
Bembesi	Queen's Mine Hotel	V. C. Andrews	5	2	7
Bindura	Bindura	C. J. Glen	13	10	8
Bromley	Bromley	A. A. Draper	4	1	6
Charter—Mgez	Beatrice Mine	W. Krienke	31	28	26
Central	Umvuma	— James	27	24	29
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	12	9	14
Enterprise	Arcturus Hotel	J. G. M. Bernard	3	7	5
Felixburg	Felixburg	R. H. Brown	13	10	8
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	6	..	1
Gatooma	Gatooma	T. J. Golding	20	17	15
Gazaland	Chipinga	W. Wood	27	24	29
Greystone	Various farm houses, Shangani	M. Kerr	13	10	8
Hartley	Hartley	J. de L. Nimmo	27	24	29
Headlands	Headlands	J. M. Harvard	27	..	29
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	13	10	8
Insiza—Shangani	Shangani	T. E. Penny	..	..	1
Inyanga	Farm Cheshire	F. W. Thiel	27	24	29
Inyazura	Inyazura	A. C. Curling	17	21	19
Iron Mine Hill	Iron Mine Hill	T. Irving	13	10	8
Lalapansi	Lalapansi	N. A. Bradford	20	17	15
Lomagund	Sinoia	A. H. Layard	20	17	15
Lydiate	Norton	W. Wrench	27	24	29
Macheke	Macheke	J. Cheyne		No fixed dates	
Makwiro	Makwiro	C. D. Voigt	19	16	21
Marandellas and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	6	3	1
Makoni	Rusape	H. Barnes Pope	6	3	1
Makoni North	Makoni North	———	27	24	29
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	3	7	5
Matopo Branch, R.L. and F.A.	Sibali	———	..	14	..
Mazoe	Glendale Siding	A. G. McCall	10	14	12
Melsetter (North)	Various farms	Rev. R. Wodehouse	..	..	1
Midlands	Gwelo	A. Cox, Box 93, Gwelo	12	9	14
Northern Umtali	Farm Summerfield	R. O. H. Blurton	..	3	..
Norton and District	Norton Store	H. Grimmer	6	3	1
Que Que	Que Que	E. J. Ross	20	17	15
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	26	30	28
Shamva	Shamva	Wm. Scott	..	21	..
Selukwe	Selukwe	F. S. Clark		No fixed dates	
Somabula and Shangani Flats	Weltevrede School	G. B. Botha	..	10	..
Umvukwe	Various ranches	H. K. Bracewell	13	10	8
Umtali	Christmas Pass Hotel	J. S. Holland	6	3	1
Victoria	Victoria	John Rennie	5	2	7
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	13	10	8

Departmental Notices.

The full series of notices usually published under this head does not appear this month, and will be omitted in future. New notices and amendments of old ones will be published from time to time. The departmental announcements with which our readers are familiar, nevertheless, remain in force as before. The services of the officers of the Department are always available, whether it be for replying to enquiries or by personal visits to farms or by lectures to associations. Full particulars can be obtained from the Director of Agriculture, Salisbury, in reference to any of the subjects previously dealt with in these pages, such as supply of seeds and trees, co-operative seed distribution, insect pests, chemical analyses, and technical advice on veterinary matters, irrigation, citrus culture, poisonous plants and plant identification, examination of soils, dips, products, etc.; and generally on all questions relating to live stock and to tillage operations.

Farm Seeds

The undermentioned seeds grown on the Government Experiment Farms are offered for sale at the prices stated. The amounts available are limited, and it is not expected that more than two or three bags of maize seed can be supplied to any one applicant.

The prices quoted are f.o.r. Salisbury, or, when available, from the Gwebi Experiment Farm. The distribution of seed will commence from the 1st September, except in the case of Napier's fodder, which will be distributed from the 1st December only. Napier's fodder will be sold in bags containing approximately 200 roots, but no guarantee can be given of the exact number contained in each bag.

On account of the limited supply available in some cases, it is impossible to guarantee the full delivery of any order. *Farmers are therefore requested not to enclose cheques until they are advised as to the amount of seed allotted to them.* The seeds are consigned carriage forward in the case of stations. In the case of sidings the amount of railage will be notified after despatch.

All orders for seed must be addressed to the Government Agriculturist, Department of Agriculture, Salisbury.

1. Specially selected seed maize, Salisbury White, Hickory King 10-row and Hickory King 8-row, 15s. per 100 lbs.

The above shelled seed has all been carefully selected, tipped, butted and hand-shelled.

2. Boer manna seed, 3d. per lb.
3. Buckwheat (Japanese), 10s. per 100 lbs.
4. Castor oil beans, 2d. per lb., 15s. per 100 lbs.
5. Dhal (ordinary), 2d. per lb., 15s. per 100 lbs.
6. Ground nuts (Spanish and Virginia Bunch), 15s. per 75 lbs.
7. Linseed (white flowering), 6d. per lb.
8. Melon (Makamaan), 1s. per lb.
9. Melon (majorda), 1s. per lb.
10. Oats (Kherson's 60-day), 24s. per bag of 120 lbs.
11. Pumpkin (iron bark), 2s. per lb.
12. Sudan grass seed, 2s. 6d. per lb.
13. Sunflower (black seeded), 2d. per lb., 15s. per 100 lbs.
14. Teff grass seed, 3d. per lb., 10s. per 50 lbs.
15. Velvet bean seed, 25s. per 100 lbs.
16. Wheat (Yellow Cross), 15s. per 100 lbs.
17. Napier's fodder roots, 5s. per bag containing approximately 200 roots.

Forest Nursery—Sale of Trees

The undermentioned varieties of trees are now available, price, f.o.r. Salisbury, 1d. each, 8s. 4d. per 100. The following reductions are made on large orders, on condition that the tins are returned, otherwise they will be charged up at 3d. per tin:—£3 per 1,000, £2 10s. per 1,000 for orders of over 5,000. Average height of trees, 3 to 9 inches; average number in tin, 25; average weight of tin, 25 lbs.

Callitris calcarata—Cypress pine.
,, robusta—Murray pine.
Casuarina leptoclado—Beefwood.
Cedrela toona.
Cupressus arizonica.
,, sempervirens, var. pyramidalis—Churchyard cypress.
,, sempervirens, var. horizontalis—Common cypress.
,, torulosa—Himalayan cypress.

Eucalyptus amygdalina—Peppermint gum.
,, botryoides.
,, calophylla—White flowering gum.
,, citriodora—Lemon-scented gum.
,, crebra—Ironbark.
,, melliodora—Grey box gum.
,, microtheca—Coolibah gum.
,, paniculata—Ironbark.
,, robusta—Swamp mahogany.
,, rostrata—Red gum.
,, saligna.
,, maculata—Spotted gum.
,, sieberiana.
Grevillea robusta—Silky oak.
Jacaranda.
Loquat.
Tristania conferta.
Thuya orientalis—Arbor vitæ.

Hedge Plants (plant 18 inches apart).

Callistemon—Bottle brush.
Dodonaea viscosa.
Pittosporum undulatum—Camphor laurel.
Tecoma Smithii.

Larger sized trees at 3d. each, 4 in tin, weighing 25 lbs. :—

Callitris calcarata—Cypress pine.
,, robusta—Murray pine.
,, Whytei—Blantyre cedar.
Casuarina leptoclado—Beefwood.
Cedrela toona.
Cinnamomum camphora—Camphor.
Cupressus arizonica.
,, torulosa—Himalayan cypress.
Dalbergia sissoo.
Eucalyptus botryoides.
,, rostrata.
,, saligna.
Jacaranda.
Lagunaria.
Pittosporum undulatum—Camphor laurel.
Pinus halepensis—Aleppo pine.
Psidium pomiferum—Guava (yellow rind, pink centre
,, cattleyanum (claret coloured rind).
,, pygmæum.
Salix babylonica—Weeping willow.
Tristania conferta.
Thuya orientalis.

Shrubs

Price, f.o.r. Salisbury, 6d. each. Some of these are planted 4 in tin, but there is usually a fair stock in single tins.

Red.	Approx. height of growth.
Callistemon—Bottle brush	10 ft.
Christ thorn	2 ft.
Euphorbia jacquinaflora	4 ft.
Hibiscus, single	8 ft.
,, double	6 ft.
Holmskioldia	8 ft.
Plumieria (Frangipane)	8 ft.
Poinsettia	8 ft.
,, double red	8 ft.
Russellia	3 ft.
Tecoma capensis—Kaffir honeysuckle	6 ft.
Pink.	
Dombeya—Rhodesian mallow	10 ft.
Lagerstrœmia flos-regina—Indian crepe	10 ft.
Oleander—Double pink	10 ft.
Salvia	3 ft.
Sensitive plant	1 ft.
Mauve—Magenta.	
Bauhinia	20 ft.
Bougainvillea	10 ft.
Iochroma	10 ft.
Lasiandra	6 ft.
Salvia	3 ft.
Blue.	
Buddleia	6 ft.
Duranta	10 ft.
Heliotrope	3 ft.
Iochroma	8 ft.
Plumbago	3 ft.
White.	
Althea—Xmas rose	5 ft.
Bauhinia	20 ft.
Deutzia—Bridal wreath	5 ft.
Gardenia	4 ft.
,, (Rhodesian)	15 ft.
Lantana bush	8 ft.
Lemon-scented verbena	5 ft.
Pittosporum undulatum—Camphor laurel	8 ft.
Spirea—Cape may	4 ft.
Yellow.	
Abutilon—Chinese lantern	8 ft.
,, Variegated leaf	8 ft.

	Approx. height of growth.
Acacia cultriformis—Wattle	12 ft.
Alamanda nerifolia	4 ft.
Buddleia	10 ft.
Cape jasmine	10 ft.
Cassia—Cape laburnum	8 ft.
,, florida	10 ft.
,, from Umtali	8 ft.
Cestrum aurantiacum	5 ft.
Holmskioldia	8 ft.
Hypericum—St. John's wurt	4 ft.
Michelia champaca	20 ft.
Poinsettia	8 ft.
Streptosolon Jamesonii	3 ft.
Tecoma Smithii	10 ft.
,, elephantissima	6 ft.
Thevetia nerifolia	6 ft.

Climbers.

Beaumontia—White.
Bougainvillea—Magenta.
Clitoria ternata—Mussel shell creeper—Blue.
,, ,, ,, ,, White.
Cereus grandiflora (queen of the night)—Yellow.
Dutchman's pipe (Aristolochia sypho).
Golden shower (Bignonia venusta).
Granadilla.
Ivy.
Jasmine—White.
,, sambac—White.
,, Yellow.
Mandevillea—White.
Phaseolus caracalla—White.
Potato creeper (Solanum Wenlandii)—Blue.
Zimbabwe creeper (Podranea)—Pink.

Shrubs for Hedges.

Price 3d. each; planted 16 in tin, weighing 25 lbs.

Holmskioldia—Red.
,, Yellow.
Lantana bush.
Macartney rose.
Spirea (Cape may).
Tecoma capensis—Red.

No orders can be supplied until paid for. Full particulars regarding forwarding should be addressed to the Government Agriculturist and Botanist, Department of Agriculture, Salisbury.

The following trees, plants and shrubs may be obtained from the Rhodes Matopo Park, Matopos:—

In single tins, size of plants 3 to 9 inches; price per plant, 3d. :—
Jacaranda.
Casuarina quadrivalvis.
,, tenuissima.
Cupressus arizonica.
,, elegans.

20 in tin, at 1d. each :—
Eucalyptus resinifera.
,, polyanthema.

Shrubs, 3 to 9 inches high, in single tins, 6d. each :—
Duranta Plumieri.
Callistemon salignus (Bottle brush).
Poinsettia.
Podranea (Zimbabwe creeper).
Aberia caffra (Kei apple).

Napier fodder can be supplied in bags containing approximately 200 roots at 5s. per bag.

Applications for trees or plants from the Matopo Park nursery should be made to W. E. Dowsett, Rhodes Matopo Park, Matopos, and the prices quoted above are f.o.r. Matopos.

The Analysis of Agricultural Products, Soils, Water, etc.

SCALE OF CHARGES.

Arrangements have now been made for the chemical examination of soils, grain, and other produce, oil-seeds, milk, water, fertilisers, etc., on behalf of farmers and others by the Chemist attached to the Department of Agriculture. The charges made, while not covering the cost, will help to defray the expense and serve as a proof of good faith. Samples, carriage prepaid, together with full particulars regarding the subject, should be addressed to the Agricultural Chemist, Department of Agriculture, Salisbury.

Schedule of Charges.	£	s.	d.
1. Partial analysis of a manure or feeding stuff, for each constituent	0	5	0
2. Complete analysis and valuation of a manure or feeding stuff	1	0	0
3. Analysis of agricultural products, *e.g.*, grain, hay, roots, etc.	1	0	0
4. Analysis of water for agricultural purposes, irrigation or drainage	1	5	0

	£	s.	d.
5. Partial analysis of soil to determine fertility and recommendations as to manurial treatment	2	0	0
6. Complete analysis of a soil	3	0	0
7. Milk—determination of total fat and solids ...	0	5	0
do. do. of fat only	0	2	6
do. complete analysis	0	10	0
8. Cream—determination of fat only	0	2	6
do. complete analysis	0	10	0
9. Analysis of cheese	0	10	0
10. Limestone—estimation of percentage of lime	0	5	0
do. complete analysis	1	0	0

Remittances should accompany samples submitted.

No charge will be made where the material forwarded is considered by the Director of Agriculture and Chemist to be of sufficient general interest.

Directions for Taking Samples of Soils.

It is recommended to select four or five spots at least, per acre, taking care that these represent as far as possible the general character of the soil of the field. If the soil of the area to be reported upon presents notable differences, the samples gathered from the different parts must be kept separate.

Having selected a proper spot, pull up the plants growing upon it and remove surface accumulations of decaying leaves, etc., if any. Dig a hole about twelve inches deep and trim one side so as to be smooth and vertical; from the side so prepared remove with the aid of a sharp spade a slice of uniform thickness—about three or four inches—down to a depth of nine inches. Place the slice on a clean board or cloth and mix thoroughly with similar slices obtained in the same way from other parts of the field area. About six pounds of the mixture are then placed in a clean cloth bag or wooden box. Forward with the sample the following particulars:—

Date of collection, exact location, position (hillside, vlei or flat), peculiarities of soil or sub-soil, behaviour in wet and dry seasons, crops borne, previous manurial treatment, and every circumstance in fact which will throw light on its agricultural qualities.

Directions for Taking Samples of Grains, Produce and Feeding Stuffs.

Grains, meal and feeding stuffs and all agricultural produce should be sampled in the same manner as prescribed for fertilisers.

When the feeding stuff is in the state of cake, select not less than three cakes where the quantity does not exceed one ton, not less than five cakes when the quantity does not exceed five tons, and not less than ten cakes when the quantity exceeds five tons.

Break the selected cakes into small pieces, mix them together, and take the sample—not less than one pound—from the mixture.

Directions for Taking Samples of Fertilisers.

If delivered in bags, select not less than two bags when the quantity does not exceed one ton, and one additional bag for every additional ton.

In no case need more than ten bags be selected.

Empty the selected bags separately on to a clean wooden or stone floor. Thoroughly mix the contents, and set aside one spadeful from each bag, mix together the separate spadefuls, and from the mixture take about one pound as a sample.

If the fertiliser is in bulk, mix together portions taken from the different parts, and draw the sample from the mixture.

Directions for Taking Samples of Water.

All samples should be sent in glass bottles. Stoneware jars are to be avoided. The bottles should preferably be provided with glass stoppers; if corks are used, they must be new and well washed previously in pure water.

In sampling a stream or tank, before taking the samples rinse out the bottle several times with water, taking care to avoid the introduction of mud or sediment.

Before taking a sample of water from a pipe, allow the water to run through it for a few minutes at full pressure.

In all cases, before the sample is taken, always rinse out the bottle several times with the water to be sampled.

Quantity to be taken: 1 gallon.

Directions for Taking Samples of Milk and Cream for Butter-Fat Determinations.

The bulk from which the sample is to be drawn should be first poured two or three times from one vessel to another, and about half-a-pint forwarded for examination.

If it is impossible to deliver the sample in a fresh condition, introduce into each sample bottle about as much of the following preservatives as can be held upon a threepenny piece:—Borax, boric acid or salicylic acid; stating which preservative has been used.

All bottles used must have been previously cleansed with boiling water.

Directions for Taking Samples of Dip

Taking a sample of dip requires care, and should never be left to a native. Thoroughly cleanse a bottle of the "whisky" size. When the contents of the tank have been thoroughly stirred, preferably by the actual dipping of cattle, rinse out the bottle with solution from the tank. Then fill the bottle completely with solution, cork securely, and *stick on the bottle* a label stating sender's name, farm, postal address, kind of dip used, and the date on which the sample was taken.

It is not necessary to send a covering letter, except when special information in addition to the analysis is required.

When it is expected that the sample will take a week or more to reach the laboratory, it is wise to add about 10 spots of sulphuric acid (free from arsenic), to prevent oxidation *en route*.

A farmer should not expect the Chemist's analysis to save him the trouble of keeping account of the amount of water and dip added to or lost from his tank.

Lectures for Farmers

The services of certain of the officers of the Department of Agriculture and the Veterinary Department are available for purposes of delivering lectures on subjects upon which they have special knowledge. As far as practicable, lectures will be accompanied by demonstrations at the time or subsequently in the field. Owing to the many calls on the time of the staff and the exigencies of their duties, alternative dates are desirable in order to avoid disappointment. The following topics are

offered as examples of subjects that may be dealt with in this manner, but the suggestion of other themes is invited.

Agriculture.—Maize growing; Maize selection and maintenance of the breeding plot; Points of maize and maize judging, with demonstrations; Utilisation of granite vlei soils; Ground nut culture; Rotation crops for home use and for sale; Veld improvement by winter grasses; Production of foodstuffs for the mines; Ensilage; Fungoid diseases of maize and wheat; Wheat, oats and lucerne under irrigation; The prospects of cotton culture in Southern Rhodesia.

Veterinary Hygiene.—Detection and prevention of disease; The care of live stock.

Live Stock.—Judging of cattle according to breeds, and for beef, milk and draught; feeding and kraaling of live stock; general principles of cattle breeding; management of imported stock; grading up of native or local stock with pure bred bulls.

Dairying.—Home butter-making; building and equipment of a farm dairy; handling and marketing of milk; packing and marketing of butter; construction of cow houses.

Swine Husbandry.—Breeding and feeding of swine; some suggestions for the production of first-class bacon pigs; construction of piggeries at moderate cost.

Chemistry.—The principles of soil fertility; the principles of manuring; the value of lime in agriculture; chemistry of milk and its products (accompanied by demonstrations in milk-testing).

Entomology.—Economic entomology on the farm; the role of insects and their allies in the transmission of disease; scale insects and fruit trees and methods for their control; insect pests and maize; enemies of the potato, insect and fungus; the value and objects of plant import and nursery regulations.

Irrigation.—Methods of applying water to land for irrigation; the measurement of water in connection with irrigation; canal irrigation; storage reservoirs; hints on the selection of sites and on the design of earthen and other dams; irrigation by pumping, with notes on the selection of plants.

Enquiries and invitations should in the first instance be addressed to the Director of Agriculture, Salisbury.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only:—

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultural Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 300. The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E.

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 126. Turkish Tobacco.
No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. Tobacco Culture (Virginia)—Harvesting and Curing.

No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 251. Cultural Notes on Onions, by J. A. T. Walters, B.A.
No. 252. Cultural Notes on Buckwheat, by J. A. T. Walters, B.A.
No. 253. Wheat Production in Southern Rhodesia.
No. 258. Winter Wheat, by J. A. T. Walters, B.A.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworm, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.
No. 261. Turnip Sawfly, by R. W. Jack, F.E.S.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.
No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.
No. 53. Animals Diseases Consolidation Ordinance, 1904.
No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.
No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.
No. 95. Oestrus-ovis in Sheep, by Alec King.
No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.
No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.
No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.
No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.
No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.
No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.
No. 223. A Note on Contagious Abortion, by Ll. E. W. Bevan, Government Veterinary Bacteriologist.

LIVE STOCK.

No. 96. Swine Breeds and Breeding of, by Loudon M. Douglas, F.R.S.E.
No. 145. Prospects for Importation of Cattle from Australia, by Eric A Nobbs, Ph.D., B.Sc.
No. 161. Notes on Cattle Breeding, Part III., by R. C. Simmons.
No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.
No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.
No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.
No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R. C. Simmons.
No. 227. An Experiment in Beef Production, by R. C. Simmons.
No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.
No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.
No. 242. Construction of Dipping Tanks (Revised).
No. 243. Shedding for Milch Cows, by R. C. Simmons.
No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.
No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.
No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.
No. 134. Plans and Specifications for Flue Curing Tobacco Barns.
No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.
No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.
No. 157. Hints on Brickmaking, by G. T. Dyke.
No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.
No. 183. The Rainy Season in Southern Rhodesia, by the Rev. E. Goetz, S.J.

No. 184 **Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.**
No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.
No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.
No. 199. Eucalypts for the Farm, by J. J. Boocock.
No. 205. Home Butter Making, by R. C. Simmons.
No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
No. 213. **Hydraulic Rams, by W. Martin Watt.**
No. 217. Windbreaks and Hedges, by F. B. Willoughby.
No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 226. Classification of Clouds.
No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.
No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.
No. 237. The Analysis of Agricultural Products, Soils, Water, etc.
No. 241. Hints on Cement Concrete, by W. M. Watt.
No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.
No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist.
No. 254. Hints on Explosives, by W. M. Watt.
No. 255. Pound Fees.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 257. Maize Grading, by J. A. T. Walters, B.A.
No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 260. Rhodesian Farm Orchard, by A. G. Turner.
No. 263. How to Build a Cattle Crush (two methods), by J. H. Fleming and R. C. Simmons.
No. 264. Nature Notes—Adaptation, by C. F. M. Swynnerton, F.L.S.
No. 265. Rose Culture, by N. L. Kaye Eddie.
No. 266. Directory of Farmers. (Price 1s.)
No. 267. Trees for Farm and Ornamental Purposes, by W. E. Dowsett.
No. 270. Odzani River Irrigation Scheme, by W. M. Watt.
No. 271. Nature Notes—Plant Collecting, by F. Eyles, F.L.S.

Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.

Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.

Game Law: Summary of.

Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Employment on Farms.

The Department of Agriculture receives numerous enquiries from persons of varied attainments, age and financial position for openings on farms, as managers, assistants and learners, requiring remuneration on corresponding scales, or willing to give services in return for keep.

In order that work may be found for the above and needs of farmers met, applications are invited from both employers and persons seeking employment. Applications are also invited from artisans, such as masons, bricklayers, carpenters, fencers, well sinkers, concrete workers, and the like who may desire work on farms. In cases where employers have obtained the labour they require, or applicants for employment have found work, it is requested that notification be at once sent to the Department of Agriculture, in order that unnecessary correspondence be avoided.

Replies to the following applications should be addressed to the initials of the advertisers, c/o Director of Agriculture, who will forward the letter to the party referred to.

Note.—The following advertisements will not be repeated unless the advertisers inform us they wish them to be continued:—

SITUATIONS WANTED.

C. P. W.—As manager or to work farm on shares. Sixteen years in Rhodesia; married; experienced with cattle, irrigation and general farming.

A. B. B.—As manager on general farm. Experienced with stock, agriculture and dairy. Excellent references.

Government Notices.

Government Notices affecting the farming industry will in future be published only *once* in the *Agricultural Journal*. This applies to original Notices and to amending Notices. Readers are, therefore, advised to preserve their files of back numbers of the *Journal*, to which they will be able to refer for information respecting the various laws, regulations, etc., in force.

EXPORT OF CATTLE TO THE UNION OF SOUTH AFRICA.

IT is hereby notified for public information that the Government of the Union of South Africa has intimated to the Administration of Southern Rhodesia that it is prepared to allow Mashonaland cattle to be railed to the quarantine section of the Johannesburg and Pretoria abattoirs on condition that such cattle are first detained in Matabeleland for two months immediately prior to being trucked.

The Bechuanaland Protectorate authorities have expressed their willingness to allow these cattle to pass through their territory.

The export of cows in calf or with calves at foot is prohibited.

No. 342 of 1917.] [31st August, 1917.

AFRICAN COAST FEVER.

HIS Honour the Administrator in Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to amend Government Notice No. 281 of 1917 by the deletion of the guard area in the Mazoe native district.

No. 351 of 1917.] [7th September, 1917.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease, to wit, African Coast Fever, on the farm Engwa, in the native district of Umtali, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to amend Government Notice No. 282 of 1915 by including the farms Pamheni, Matura, Brown Hill, Mazonwe, Clydesdale, Gilmerton and Stewarton North and the portions of the farms Stewarton South and Muromo lying west of the Impodsi River.

No. 352 of 1917.] [7th September, 1917.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

HIS Honour the Administrator in Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to amend Government Notice No. 270 of 1917 by including the farm Gilmerton.

No. 305 of 1917.] [3rd August, 1917.

COMPULSORY DIPPING OF CATTLE: UMVUKWE AREA, MAZOE DISTRICT.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," to de

clare that within the area defined below, on and after the publication hereof, every owner of cattle shall cause the same to be dipped in an approved dip of standard strength at intervals not exceeding fourteen days, except during the months of June, July, August and September, when the intervals shall not exceed twenty-eight days.

Description of Area.

An area bounded by and including the following farms:—Long Ranche, Umsengedsi, Stockbury, Pembi Junction, Galloway, Stockwell, Ealing, Umvukwe Flats, Brotherton, Mondynes, Omeath, Ruorka Ranche, The Three Sisters, Msorodoni, Wengi River Estate, Umvurodonna and Nyachura; thence from the south-east beacon of Nyachura along the western boundary of the Chiweshe and Negumbo Reserve to the Chitonzwe Hill, and from thence direct to the north-east beacon of the farm Long Ranche.

No. 324 of 1917.] [17th August, 1917.

COMPULSORY DIPPING OF CATTLE: LOMAGUNDI NATIVE DISTRICT.

IN accordance with the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," notice is hereby given that the owners resident in the area described below have by a majority of votes requested His Honour the Administrator to bring compulsory dipping of cattle into operation in the said area.

Any person desiring to lodge an objection to the bringing into operation of compulsory dipping as aforesaid shall do so on or before 19th October, 1917.

Description of Area.

The Lomagundi native district, excluding the farms Rothwell Extension and Hunyani Estate.

No. 325 of 1917.] [17th August, 1917.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 9 of the "Compulsory Dipping Ordinance, 1914," to suspend until further notice compulsory dipping of cattle, as provided for by Government Notice No. 201 of 1917, in the Fungwi Reserve and that portion of Maramba Reserve, in the native district of Mrewa, lying north-eastwards of a line drawn from the junction of the Shamba and Nyadiri Rivers to the junction of the Mahamba and Mazoe Rivers.

No. 326 of 1917.] [17th August, 1917.

COMPULSORY DIPPING OF CATTLE: UMTALI AREA.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," to declare that within the area defined below, on and after the publication hereof, every owner of cattle shall cause the same to be dipped in an approved dip of standard strength at intervals not exceeding seven days, except during the months of June, July and August, when the intervals shall not exceed fourteen days.

Description of Area.

The native district of Umtali, excluding that portion lying west of the Odzi River and also excluding the farms Tom's Hope West, Steynstroom, Thabanchu, Penkridge, MacAndrew's, Lisnacloon and Cronley.

No. 353 of 1917.] [7th September, 1917.

COMPULSORY DIPPING OF CATTLE: SELUKWE NATIVE DISTRICT.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," to declare that within the area defined below, on and after the publication hereof, every owner of cattle shall cause the same to be dipped in an approved dip of standard strength at intervals not exceeding seven days, except during the months of June, July and August, when the intervals shall not exceed fourteen days.

Description of Area.

The Selukwe native district, including Byrne's farm.

No. 366 of 1917.] [21st September, 1917.

COMPULSORY DIPPING OF CATTLE: GWELO—QUE QUE AREA.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 2 of the "Compulsory Dipping Ordinance, 1914," to declare that within the area defined below, on and after the publication hereof, every owner of cattle shall cause same to be dipped in an approved dip of standard strength at intervals not exceeding seven days, except during the months of May, June, July and August, when the intervals shall not exceed fourteen days.

Description of Area.

The Gwelo native district, excluding that portion already included in Hartley-Gatooma-Battlefields area published under Government Notice No. 45 of 1917.

No. 327 of 1917.] [17th August, 1917.

TRYPANOSOMIASIS.

HIS Honour the Administrator has been pleased, under and by virtue of the powers conferred on him by the "Animals Diseases Consolidation Ordinance, 1904," to make the following provisions for the suppression of the disease trypanosomiasis in the native district of Hartley:—

1. All donkeys within the area described hereunder shall be removed therefrom within a period of two months from the date hereof to such places as may be appointed by the Chief Veterinary Surgeon, for examination and disposal according to law.

2. The introduction of donkeys into the aforesaid area is prohibited.

3. Any person refusing to remove donkeys from the aforesaid area or introducing donkeys thereinto shall be liable to a fine not exceeding £20, and in default of payment to imprisonment with or without hard labour for a period not exceeding three months.

Description of Area.

An area in the native district of Hartley, bounded by a line drawn from Robb's Drift, on the Umniati River, eastwards along, but excluding, Robb's Road to Nyampane; thence northwards along the road from Golden Valley to Emerald Mine to a point near Nouso's Kraal where this road meets Hastings Road; thence eastwards along Hastings Road to where it crosses the Nyabango River; thence down the Nyabango River to its junction with the Umfuli River; thence down this river to Linscott's Drift; thence in a south-westerly direction along, but excluding, Linscott's wagon road to Linscott's Drift on the Umniati River, close to its confluence with the Gadza River; thence up the Umniati River to the point first named.

WATER ORDINANCE, 1913.

IN terms of section 7 of the regulations published under Government Notice No. 459 of 22nd December, 1916, I declare the following gentlemen to have been duly elected as members of the Odzani Irrigation Board :—

Oswald Trevor Baker.
Walter Henry Deall.
Rhys Seymour Fairbridge.
John Lamport Stokes.
Walter H. Swain.

N. H. CHATAWAY,
Acting Magistrate and Returning Officer.

Umtali, 13th August, 1917.

No. 343 of 1917.] [31st August, 1917.

RESERVATION OF TIMBER.

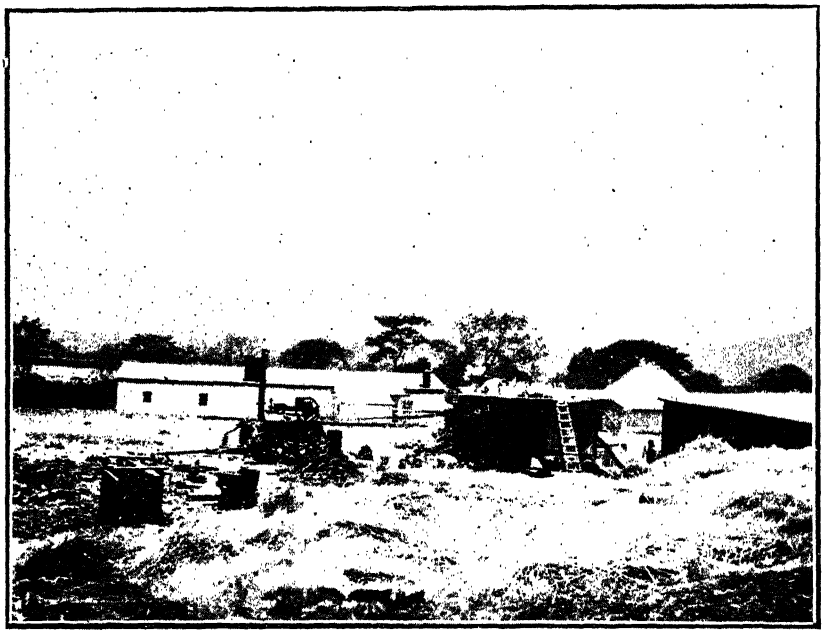
IT is hereby notified that all timber for a distance of 50 feet on either side of all public streams in Southern Rhodesia is hereby reserved, under section 12 (2) (d) of the "Mines and Minerals Ordinance, 1903," against cutting for mining purposes.

Note.—The definition of a public stream is as follows :—

"Public stream"—A natural stream of water—

(1) which in ordinary seasons flows in a known and defined channel (whether or not such channel is dry during any period of the year), and

(2) which is capable of being applied to the common use of riparian proprietors.



Wheat thrashing, Premier Estate.



Wheat thrashing, Premier Estate.

THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture,
assisted by the Staff of the Agricultural Department.

PUBLISHED BI-MONTHLY.

VOL. XIV.—NO. 6.] DECEMBER, 1917. [5s. per annum.

Editorial.

Correspondence on subjects affecting the farming industry of Southern Rhodesia is invited. Enquiries will be replied to direct, or through the medium of the JOURNAL. *An interchange of ideas and suggestions between farmers will be particularly welcomed. Contributions of a suitable nature for insertion in this* JOURNAL *will be much appreciated. All communications regarding these matters, and advertisements, should be addressed to the Editor, Department of Agriculture, Salisbury.*

AGRICULTURAL STATISTICS.—In the interests of the farming community, and particularly of all maize growers, it is right that the following facts should be made public.

The production of maize in Southern Rhodesia greatly exceeds the demands of local consumption; therefore, a reasonable average price cannot possibly be maintained unless there are facilities for regular export. On the other hand, it is obvious that, if promiscuous exportation occurred, the local price of maize might easily become inflated to a dangerous extent, with the result that the general cost of living would be increased. In this connection, and as a war measure, it has during the past two years been a practice of the Government to arrange that

sufficient grain is retained in the country to supply fully all local needs, and to issue export permits for the balance. The average annual consumption is not difficult to estimate, but a knowledge of what the amount of the exportable surplus will be can only be obtained by means of the annual return of crops supplied by the farmers under the provisions of the Statistical Ordinance.

Early in the year, before the reaping of the crop is completed, a provisional estimate of the probable total yield of maize is prepared, based on figures furnished by the farmers. This estimate is used as a rough preliminary guide in ascertaining the amount of grain that may be exported, but, though every care is taken to make the estimate as accurate as possible, it never happens that the harvest actually reaped by the farmers agrees with their expectations. Sometimes, especially when climatic conditions have been unfavourable at the end of the growing season, the difference between the estimate and the harvest is considerable.

The actual crop returns, as distinct from the estimates, are called for early in September, and, with every reasonable allowance, should all be in before the end of October. Immediately the total is known, the Government is in a position to release all grain which it is considered may safely be exported. It will thus be seen that promptitude by the individual in furnishing the required information is of the utmost importance, in order that advantage may be taken of foreign markets if supplies are sufficient to warrant export, and that the best prices may be secured for our other products. Delay by relatively a few persons prevents advantage being taken of the particulars furnished by the great majority.

This year, although most of the farmers have loyally responded to the request for statistical returns, the proportion which has failed to do so is sufficiently large to create a position of uncertainty, which prevents the issue of final permits for export. This situation blocks movement in the maize market, and is directly injurious to the farmers.

We feel convinced that the farming community does not wish the efforts of the bulk of the farmers and the Government to be nullified by the failure of a few, and it is realised that, in most cases, default is due to negligence, rather than deliberate refusal to make a return.

An intimation has been issued to all those who have not furnished returns of the intention of the Government to take action against delinquents.

SALE OF MAIZE TO THE IMPERIAL GOVERNMENT.—Delivery to the railways of the maize which farmers contracted to supply to the Wheat Commission, through the British South Africa Company, has now been completed. Collection by the railways commenced on the 15th July, and, except for a short period in August, continued without interruption until the end of October, when a total of 124,397 bags had been delivered.

Considering the difficulties with which the railways had to contend,

shortage of rolling stock, the demands on traffic for other purposes, such as chrome ore, coal, etc., and that 50 per cent. of the transport available for maize had to be set aside for other maize traffic, the collection and transportation to Beira of these consignments were satisfactory. Those responsible for shipping were unable to give timely notice of the arrival of ships at Beira, but in no case was a ship unduly detained, and about 110,000 bags have already been despatched from Beira.

The consignment was made up of grades 1, 2 and 3, in the following proportions:—(1) 64,850, (2) 55,161, and (3) 4,386. Thus the total of first grade maize amounted to 52 per cent. It will be remembered that in 1915 the proportion of first grade maize exported amounted to 44.1 per cent. only.

The sources of supply, according to districts, were as follows:—

Mazoe	73,092
Salisbury	20,142
Lomagundi	14,929
Makoni	10,077
Umtali	3,902
Marandellas	262

Except for a small quantity in the Lomagundi district, no mealies came from westward of the Hunyani River.

Drying out of Rhodesian Maize.—As stated above, the number of bags passed by the graders for export to the Imperial Government amounted to 124,397, but as contracts were per bag of 203 lbs. on rail, and as some drying out takes place between the time of bagging and loading on rails, the quantity actually despatched was equivalent to 122,404 bags, and the amount paid, at 12s. 9d. per bag, was £78,032 11s.

It will be seen from the figures given that the average loss through drying out, according to the number of bags delivered, was 1.6 per cent.; in other words, the average weight of each bag was 199.7 lbs. But, as tenderers were advised to fill bags to a weight of 205 lbs., the average loss from this cause was not less than 2.5 per cent. This figure cannot, however, be taken as an accurate measure of the loss occurring through drying out under Rhodesian conditions, because the precise original weight of bags cannot be ascertained. Although 205 lbs. was the weight recommended, instances are known of bags weighing considerably more, and some allowance must, therefore, be made for this, as well as, perhaps, for faulty scales. In another ascertained case, bags were weighed out at 209 lbs. (machine duly tested), and when taken over by the railways two months later averaged 201.5 lbs. This grain was, however, husked, shelled and bagged at once, and the probability is that the husk had prevented the grain from drying out effectively. Analyses of South African grain shew that the moisture content is never below 9 per cent. in commercial samples. It is fairly obvious, therefore, that when considerable loss through drying out occurs, the grain in the first place must have contained more than the 12 per cent. moisture prescribed as being safe for export.

RESOURCES OF RHODESIA.—Every time a natural product is added to the list of products usefully employed, the wealth of the country is proportionately increased. It follows that it is a proper function of Government to foster the investigation and exploitation of all natural resources. In a young and relatively undeveloped country the number of potentially valuable products is greater than in a country that has been long settled. This argument applied to Rhodesia suggests many discoveries of commercial importance may be expected if means can be found to survey, examine and experiment with the still untested natural products of the country. The fact that, although within the tropics, our climate is sub-tropical, and therefore adapted to the needs of an exceptionally large variety of plants, adds greatly to the probability of many industrial commodities being produced.

A realisation of these principles led to the formation of the Rhodesia Munitions and Resources Committee, which has already done good work. The Government of the Union of South Africa, with similar objects in view, has appointed an Industries Advisory Board, and that Board has now appointed a Technical Committee to deal with all scientific and technical matters and questions of research. This Committee has recommended that reports by specialists, who are to be remunerated for their work, shall be made upon a number of selected subjects relating to industries, agriculture, economics and science both pure and applied. No less than fifty-two reports have been called for and are in course of preparation, the Union Government providing the necessary funds. Investigation on this scale is obviously impossible in Rhodesia at present, and it is, therefore, of the first importance that we should keep in touch with the work going on in the Union, and, as far as possible, secure and place at the disposal of the people of Rhodesia the information now being gathered by the Technical Committee in the south.

We are glad, therefore, to be able to record that the Prime Minister of the Union invited the Rhodesian Administration to send representatives to a conference held in Johannesburg on 10th July last, when Mr. F. J. Newton and Mr. J. G. McDonald (President of the Rhodesia Munitions and Resources Committee) attended. The results were most satisfactory. In future the Rhodesia Committee will co-operate with the Union Committee. While the balance of advantage from this co-operation will be in our favour, it should not be overlooked that the Union also expects to benefit in respect to the production in Rhodesia of raw material that cannot be produced in the Union. The Union Committee includes in its activities the publication of a Journal of Industries, the first number of which will shortly be issued. It will probably contain the special reports of experts above referred to and should be of great value to the whole of South Africa.

CATTLE STATISTICS.—The annual return of cattle, other live stock and animal produce will, as usual, be called for this month, the forms being circulated about the 15th December to enable a census to be made on the 31st. It is requested that the completed forms be returned on or before the 15th January, 1918, and we hope all farmers and other

stock owners will make an effort to comply with this request. The labour of preparing the annual statistical tables would be considerably lessened if every farmer would make a point of attending to his small share of the work promptly, and the publication of results would at the same time be hastened. It will be noticed that this issue does not contain the tables of crop yields for 1917, which are usually published in December. This delay is due to the fact that a certain percentage of farmers have failed to send in returns. It may once more be pointed out that no section of the community has a greater interest in the early publication of accurate farm statistics than the farmers themselves, and it is for their benefit and at their request that the Statistical Ordinance was put on the statute book. We, therefore, confidently appeal to the farmers of Rhodesia to render hearty co-operation, so that the agricultural statistics of this country may reach and maintain a high standard as to completeness and prompt publication.

War Settlement Department.—On another page will be found an article giving detailed information regarding the arrangements that have been made for the placing of ex-soldiers and sailors on the land of Southern Rhodesia as farmer settlers. It will be remembered that the British South Africa Company, in 1916, announced that they were prepared to offer 500,000 acres of land free to approved soldier settlers, one-half of the area to be allotted in Southern Rhodesia. Subsequently additional free land was offered by some of the great estate companies and by the Rhodesia Railways, on the same terms as that offered by the British South Africa Company, so that the total available in Southern Rhodesia will considerably exceed 250,000 acres. Other companies are further assisting by offering land at greatly reduced prices, while Mr. T. Meikle has promised to assist a fixed number of soldier settlers by lending them for a long period breeding cattle, draught oxen and wagons, a public-spirited action which we hope will provoke emulation.

The conditions on which these grants of land will be made are carefully particularised in the article referred to, and doubtless their terms will not escape criticism. One criticism may safely be forestalled, and that is that no application will be entertained unless the applicant has a minimum of £1,000 available capital. Persons in England not familiar with South African conditions, or those acquainted with conditions in other colonies, such as Canada or Australia, might even be inclined to think that the insertion of such a proviso was intended to keep out settlers rather than to attract them. Other colonies are in the fortunate position of being able to offer land without any such apparently burdensome condition, and the contrast seems to place the Rhodesian offer in an unfavourable light. Things that are not comparable, however, should not be compared. The circumstances in the Dominion and the Commonwealth are diametrically different from those of Rhodesia. There, no mass of native population exists to monopolise, at low wages, the unskilled labour market. Here, the native population far exceeds that of the European, and there is no room for the white agricultural labourer, who could not compete with the cheap coloured labour.

The position of a farmer in Rhodesia is practically the same as that of a coffee or rubber planter in the tropics, where the capital and management are supplied by Europeans and the labour by aborigines. The consequence is that it would be a false charity to encourage ex-soldiers without money to come and settle on the land here. It would be disastrous to the settler and injurious to the country. Agriculturally this is a land for capitalists, and painful experience has proved that £1,000 is the minimum capital with which any settler could be recommended to start.

It is unfortunate for Rhodesia that we cannot invite settlers in unlimited numbers to come here and build up and strengthen the country. If we had great industrial centres with large populations of consumers, there would be some scope for close settlement, and the relatively poor man might become a producer of food and other commodities for the use of urban workers. Such, however, is not yet the case, though it may confidently be anticipated that the future will see manufactures of various kinds established. Meanwhile it is the course of wisdom to discourage the immigration of agricultural settlers who have no money.

In order that the business of selecting suitable settlers and distributing the free land may be properly administered, a War Settlement Department has been inaugurated, with its office in Salisbury. Enquiries on this subject should be addressed to the Controller of War Settlement, Salisbury.

Locusts.—Farmers in this Territory are doubtless somewhat exercised in their minds in connection with the recent reports of the appearance of large swarms of "hopping" locusts in certain parts of the South African Union. The fear that this outbreak may prelude an invasion of our borders by the pest is natural enough, but it may be stated positively that at the present time there is nothing to indicate that such an undesirable occurrence is imminent or even probable in the near future. It may not be generally known that a very effective system of intelligence concerning the movements of locust swarms exists in South Africa, and that the Department of Agriculture at Salisbury has kept closely in touch with the situation as regards these pests in the south for the past ten years. During this period, locusts have never been entirely absent from the South African Union, but no true locusts have been reported in Southern Rhodesia since 1910, from which fact it is obvious that trouble with the pests in the south does not necessarily mean trouble in store for this Territory. In the present instance, it is reassuring to note that the outbreak does not extend further north than the regions of Kimberley and Bloemfontein, and that, therefore, there is a very large tract of uninfested country between the northernmost swarms and our borders. It may be added that considerable supplies of locust destructive material are held in reserve by the Department to deal with a possible invasion, and that steps are being taken to add to these without delay.

PRIZE FOR WHEAT GROWING.—In the *Journal* for April, particulars were given of the prize offered by Messrs. A. F. Philip & Co., to be awarded to the farmer growing the largest quantity of wheat in Southern Rhodesia in 1917. The prize is well worth competing for, being a McCormick reaper and binder suitable for handling wheat and other small grains. All who have grown this class of crop on any serious scale will appreciate the advantage of possessing one of these labour-saving machines. We refer to the subject now in order to remind farmers that the competition closes on 7th January, 1918, by which date all claims, accompanied by a prescribed declaration, must be lodged with the Director of Agriculture, Salisbury, who has agreed to act as adjudicator.

PROTECTION OF KOORHAAN.—The attention of farmers and others is directed to Government Notice No. 452 of 23rd November, by which it is declared that koorhaan shall be strictly protected and not hunted or destroyed in Southern Rhodesia, from that date until further notice. It cannot be too widely made known that practically all game birds and other ground birds live largely on ticks and other insects, and the koorhaan holds an honourable record in this respect. It has been stated, with truth, that if all the birds were killed off, the hosts of insects on the veld would carry everything before them and practically destroy all vegetation, so that animal life would no longer be possible, and all attempts to grow crops would fail. The koorhaan is yearly becoming more and more scarce, and, seeing that he is truly the farmer's friend, we confidently appeal to all farmers for their active assistance in protecting this valuable bird. The species is also being protected throughout the greater part of the Union of South Africa, so that, being of a migratory nature, it is now safeguarded in both territories.

STONE DIPPING TANKS.—We have received from Mr. J. C. Smith, of Selukwe, a long and interesting letter, in which he gives full particulars of cattle dipping tanks which he has built in stone, instead of concrete. It is claimed that these tanks are quite effective, and their cost is much lower than that of the usual concrete tank, ranging from £35 to £56, including all material and labour. There seems to be no reason why farmers, who are so placed that they can quarry cheap and suitable stone close to the site of their tanks, should not economise in this way with good results. We regret that, owing to pressure on our space, we cannot publish Mr. Smith's letter, and doubtless our readers will remember that in October, 1915, we published an account of a stone-built dipping tank, with plan, kindly supplied by Mr. Jansen, of Melsetter.

War Settlement in Southern Rhodesia.

OFFERS OF LAND AND ASSISTANCE TO OVERSEAS SOLDIERS AND SAILORS.

In February, 1916, the Directors of the British South Africa Company informed Sir Rider Haggard, who was then *en route* to Australia on a mission on behalf of the Royal Colonial Institute to report upon the prospects offering for the settlement of ex-soldiers in the Overseas Dominions, that the Company had decided to offer land in Rhodesia, not exceeding 500,000 acres, free to approved soldier settlers from overseas, and also to undertake to provide expert advice and supervision.

It is proposed to allot half the area in Southern and half in Northern Rhodesia.

With regard to Southern Rhodesia, a provisional selection of approximately 250,000 acres, valued at £74,000, has been made in various districts.

The final and detailed selection of the land will be made by the Administrator, Sir Drummond Chaplin.

Land will be granted to ex-soldiers and sailors, who will be provisionally selected in London, but will be finally approved by the Administrator after a term of training. All grants will be subject to strict conditions of personal occupation and development, which must be fulfilled before absolute title is acquired.

The following points require to be specially borne in mind in connection with land settlement in Southern Rhodesia:—

(1) In a country in which the whole of the unskilled labour, and part of the labour which cannot be described as wholly unskilled, is performed by aboriginal natives at low wages from 10s. to 30s. per mensem, there is no scope for the immigration of European agricultural labourers. On the other hand, Rhodesia offers excellent opportunities to capable and energetic men with the qualifications which have made them good soldiers and sailors.

(2) Agricultural or stock-farming in a new sub-tropical country presents special problems, and it is highly desirable even in the case of a settler who has had experience of farming in Europe, and essential in the case of one who has not, that he should go through a preliminary training in farming under Rhodesian conditions and in the employment of native labour, before embarking his capital on a holding of his own.

(3) It is necessary that a new settler on the land should be equipped with considerable capital, estimated at not less than £1,000, to enable him to establish himself on his holding and to support himself until he is in a position to market produce.

The following arrangements have been made for carrying out the scheme above outlined:—

The Land Offered.—Land offered by the Company, situated in many parts of the country, has been inspected by officers of the Department of Agriculture, assisted by prominent local farmers. The land found to be suitable will be divided into farms of adequate size and of the most convenient form possible, and with special consideration of the needs of the prospective occupiers.

The size of the holdings will depend on the fertility of the soil and on local conditions, and will average between 1,500 and 2,000 acres, and will in no case exceed 3,000 acres, and they will be as nearly as possible of equal value.

The land will in the majority of cases be suitable for mixed farming and for live stock, rather than for any single crop, such as maize. The revenue will be spread over the year, and be derivable from a number of sources, including dairy products, pigs, poultry, occasionally beef and mutton, with such crops as are not required for the stock.

The soil, though of varying character in different districts, may be expected to grow the following crops either for direct sale or for feeding the stock:—Maize, potatoes, sweet potatoes, pumpkins and cattle melons, millets, ground nuts, various local fodders and hay crops such as velvet beans, teff, Sudan grass, Napier fodder and dhal, with tobacco, wheat and oats in certain localities, sunflower and buckwheat, besides the usual variety of vegetables and fruit required for home use or saleable in the local markets.

Capital Required.—The character and extent of the land are estimated to be such as to require, and profitably employ during the first two years of occupation, a capital of £1,000. In most cases a somewhat larger sum may be profitably employed. The purchase of an additional area of land would be recommended in the case of persons with more capital at their disposal. In no case will less than £1,000 be regarded as adequate to start with. These estimates are made regardless of funds necessary for the support of the settler's dependents until the farm can support them.

Owing to the extremely varying circumstances, not only in respect of geographical position, soil and local markets, but also in respect of the character and disposition of the individual settler, it is impossible to generalise as to the detailed distribution of this capital. The foregoing statements have been arrived at as the result of actual experience and consultation with many of the leading farmers of the country. The expenditure to be recommended and the probable revenue in respect of each farm or block of similar farms have been carefully considered, and fuller information on this point will be available to the prospective settler when choosing his land.

Preliminary Training of Settlers.—Many leading farmers have expressed a willingness to receive soldier settlers as pupils on their farms, and to afford them opportunities for learning the business of farming in return for their labour and assistance on the farm, and on the payment of a sum not exceeding £5 per month for board and lodging.

It is proposed, therefore, that immediately on arrival of the prospective settler in Rhodesia he should be placed under the personal supervision and guidance of the Controller of War Settlement. This official has been specially appointed to deal with settlers under this scheme, and all matters appertaining to their interests are under his charge. He will arrange for the settler's preliminary training for a period which will be as a rule not less than twelve months, and longer if desirable. In order to meet any expenditure resulting therefrom, the settler must deposit with the Company on his arrival the sum of £100, any unexpended portion of which will be refunded when final title is granted. The whole period will probably not be spent on one farm, but on two or three in different parts of the country, so that the settler may gain a more varied knowledge, and receive instructions in special branches of farming on those farms on which they are most successfully practised. Included in this period of training will be a course of lectures at the Government Experiment Farm on agricultural subjects of a few weeks' duration. No settler may take up land until the permission of the Administrator has been obtained. Normally this will be given after 12 to 18 months' training.

Selection of Land and Terms of Tenure.—At any time during the period of tuition opportunities will be given of selecting land. The settler will have ample opportunity of making his choice, and consulting with the Controller of War Settlement and with private individuals. Having received permission from the Administrator to take up land, he will be granted a provisional title, and will be required to proceed with the stocking and development of his farm, assisted by occasional official inspection. So soon as he shall have carried out such acts of husbandry or made such improvements as shall, in the opinion of the Administrator, constitute beneficial occupation of the land, he will be granted a full title free of survey fees and other expenses, and subject only to the usual quit rent and to the laws of the country governing the ownership of land. Throughout his training and period of probation, and until established finally on his holding, the settler will be under the direct personal supervision of the Controller of War Settlement, to whom he may look at all times for advice and assistance. Thereafter he will, in common with all farmers of the country, have at his disposal the services of the expert officers of the Department of Agriculture.

Conditions of Grant of Land.—

(a) Applicants must be British subjects of European descent from overseas who have served in either the Army or Navy during the war, and were not at the outbreak of the war domiciled in South Africa.

(b) They must be in possession of some official record of their

military service, and be recommended by the military authorities. The rank in which they may have served in the Army or Navy is immaterial.

(c) They must be able to pass a medical examination, and be certified as fit for an active outdoor life in Southern Rhodesia.

(d) They must in all cases give absolute proof of the possession of the requisite minimum capital of £1,000 in such a form as to be available when required. Men with families will further be required to give proof of the possession of adequate means for their maintenance.

(e) On arrival in Rhodesia a deposit of £100 shall be made with the Controller towards the costs of transport, board and lodging with farmers and other expenses, if any. Any unexpended balance of this sum will be returned to the settler.

(f) Special fares by sea and land will be granted to accepted settlers, and also at a later date to their families and dependents, to enable these to follow them.

(g) In the absence of special arrangements, for which the Company will not be responsible, dependents and families of settlers cannot be received on farms during the settler's period of tuition, and should not therefore proceed to Rhodesia until the settler has taken up his own farm.

(h) It will remain within the absolute discretion of the Administrator to approve or reject a settler at any time during his period of training. In the case of rejection, such settler will be provided with a passage to his home overseas.

How to Apply for Land.—Intending applicants should communicate in the first instance with the Secretary, British South Africa Company, 2, London Wall, E.C., who will furnish the necessary form on which application should be made, and who will render all possible assistance in arranging preliminaries, and give any further information that may be desired. Applicants will be required to furnish details of their age, parentage, education and employment prior to the war, military service, the possession of any special skill in a profession, mechanical handicraft or trade, and the amount of available capital which they propose to invest. They will also be required to state whether they are married or single; whether or not they have any family or immediate dependents whom they would propose to bring to Rhodesia, and to give, in the case of their possessing families or dependents, the ages and description of the same. The names of two references (preferably established business men) must be submitted in addition to all military records with each application.

In addition to the British South Africa Company, land on these terms has also been offered by the Rhodesia Railways, and will be dealt with by the Controller of War Settlement, Salisbury. The Mashonaland Agency have also offered land under these terms, regarding which communications may be addressed to them at P.O. Box 227, Bulawayo, or to the above-mentioned office. Willoughby's Consolidated Co. have

also offered free land, communications concerning which should be addressed to P.O. Box 220, Bulawayo.

The following land companies have offered to sell land to ex-soldiers at a considerable reduction below their normal prices:—

The Farm Lands of Rhodesia, Ltd., Palmerston House, Old Broad Street, London, E.C.
The Gold Fields Rhodesian Development Co., P.O. Box 4, Bulawayo.
The New Bulawayo Syndicate, Ltd., P.O. Box 227, Bulawayo.
The Crescens (Matabele) Mines & Land Co., Ltd., P.O. Box 4, Bulawayo.
The Exploring Lands & Minerals Co., P.O. Box 4, Bulawayo.

Communications regarding the above may be sent to the addresses given, or to the Controller of War Settlement, Salisbury.

Mr. T. Meikle has generously undertaken to provide for each of ten approved settlers taking up free land and possessing not more than the minimum capital of £1,000—

1 span of trained oxen,
1 span of untrained oxen,
1 wagon or Scotch cart fit for farm work,

free for a period of five years.

Also for the same period, 25 head of breeding cattle on third shares.

Other offers of practical assistance in stock are expected.

The Maize Stalk Borer.

(*CALAMISTIS FUSCA*, HMPSN.)

By RUPERT W. JACK, F.E.S., Government Entomologist.

The insect known variously as the "mealie borer," "mealie grub" or "topworm" is undoubtedly responsible for a greater aggregate reduction in the profit on the maize crop than any other insect pest in South Africa. The intensity of its attack varies considerably from year to year, but it is one of those pests with which the farmer must always reckon as an agent through which very serious harm may come to his crop. Whilst most Rhodesian farmers are quite familiar with the nature of the "borer" and its method of attacking the plant, certain members of the community are apt to confuse its work with that of "cutworms," a pest of entirely different habits. That such confusion is extremely unprofitable must be obvious to all. Borer and cutworms are both serious pests, and can only be fought successfully if the farmer has a knowledge of their respective habits. Control measures which are effective in reducing the attack of the one are likely to be altogether useless when employed against the other. The present paper aims, incidentally, at removing any confusion of this nature, and more especially at furnishing Rhodesian farmers with an up-to-date account of the appearance, habits and life history of the borer.

Distinction between Maize Stalk Borer and Cutworm.—There is so little resemblance between the attack of these two pests that a few words will convey all the information necessary. The borer lives inside the stalk or under the protection of the leaf-sheaths of the plant, and causes damage by interfering with the supply of sap, so that the upper parts frequently wither and die after considerable growth has been made. Cutworms, on the other hand, live apart from the plants on which they feed, sheltering in the soil or under rubbish, etc., during the day, and seeking their food plants at night. The most characteristic and conspicuous form of damage due to them is the cutting off of the young plants at the ground level early in the season.

Description and Life History.—The adult moth (see Plate I., Fig. 1) measures about 1½ inches across the expanded wings, but the variation in size is considerable, as more or less dwarfed specimens are commonly produced from borers that have not obtained their full amount of nourishment. The fore-wings are reddish brown to brown in colour, and vary considerably in the intensity of their markings, the most constant characteristic being a row of yellowish dots, close to and nearly parallel

with the outer margin of the wing. The hind-wings are pale yellowish tinged with brown.

There are two broods of the insect during the year. The moths, which are strictly nocturnal in their habits, are on the wing in late November and early December, and again in the latter part of February and early March.

The eggs are laid in clumps (see Plate I., Fig. 2) attached to the inside of the leaf-sheaths of the plant, generally within an inch or two of where the leaf branches away from the stalk (see Plate II.). The clumps contain a variable number of eggs, the one illustrated being an average specimen. The eggs are lightly "glued" to the leaf-sheath, but more strongly to each other, so that the clumps can frequently be removed from the leaf-sheath in an unbroken condition. Like those of many other moths, the eggs are pretty objects under the microscope, being ribbed and sculptured in a highly attractive manner. Their actual dimensions are about .7 m.m. wide by .45 m.m. deep, a millimetre (m.m.) equalling about one twenty-fifth of an inch. Mr. C. W. Mally, Entomologist for the Cape Province, states that at Grahamstown the eggs hatched in from seven to nine days. The period has not been observed in Rhodesia.

The newly-hatched borers or larvæ (Plate I., Fig. 3) measure roughly one-twelfth of an inch in length. The body is whitish and the head dark, nearly black. Unlike some allied species (*Agrotinæ*), the false legs or claspers, consisting of five pairs, are all fully developed in the newly-hatched larva. The borers commence feeding at once under the protection of the unopened leaves, which they pierce in a manner giving a characteristic effect after the leaves open. During the early part of their growth the young borers are of a purplish brown tint, but become whitish later.

The clump of eggs shewn at Plate I., Fig. 2, numbers something over sixty, and the young unopened leaves and tenderer portions of a maize plant frequently shelter as many young borers. It is, however, obvious that a single plant is not capable of supporting even half this number to maturity. The matter is adjusted by the migration from the original plant of a portion of the young borers which have hatched out and spent their earliest days thereon. The necessary stimulus for this movement seems to be provided rather by crowded conditions than actual exhaustion of the food supply. This migration probably takes place at night, and has not actually been observed. In a maize field a considerable proportion of the wandering larvæ are doubtless successful in finding other plants, into which they soon eat their way. In this way a number of plants, on which eggs have not been laid, may become infested with the offspring of a single female moth. Such plants are not, as a rule, heavily infested nor badly injured, whilst, owing to the lack of injury to the young leaves, the fact of their being attacked at all is easily overlooked.

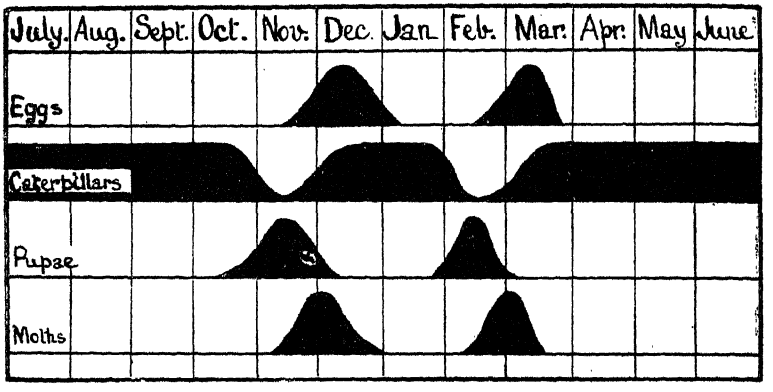
When full grown, the borer measures about an inch and a quarter in length. (Plate I., Fig. 4). The borers of the first, or spring, brood

are to be found in the maize plants mainly from early December until late February, and those of the second brood from late February to November. The two broods overlap somewhat, and it is no uncommon thing in February to find large borers of the first brood in the same plant with young borers of the second brood. The borers of the first brood on attaining full growth change at once into the pupa or chrysalis stage inside the stalk of the plant. Those of the second brood remain in a full-grown condition over the winter, and mostly change to pupæ in November. Previous to becoming a pupa, the caterpillar prepares a hole in the stalk, through which the moth escapes later. The duration of the pupa stage is from a fortnight to three weeks.

Curious irregularities in the broods occur at times. In one instance a pupa was found in a maize plant in the middle of January, and yielded a moth on 1st February. On another occasion some maize plants, growing under irrigation in a kitchen garden, were found to be infested with borer on the 20th December. The plants, which were well grown, contained borers varying from one-half to nearly full grown, and also pupæ. From these stalks moths emerged from the first week in January to the end of February. It is judged that the parent moths of at least the pupæ found in this instance must have been on the wing in October, which is extremely early for Rhodesia. Further, the emergence of moths from the spring brood of caterpillars during the first week in January suggests that three broods might have matured in this instance during the year, for belated moths of the over-wintering brood sometimes emerge even later than this.

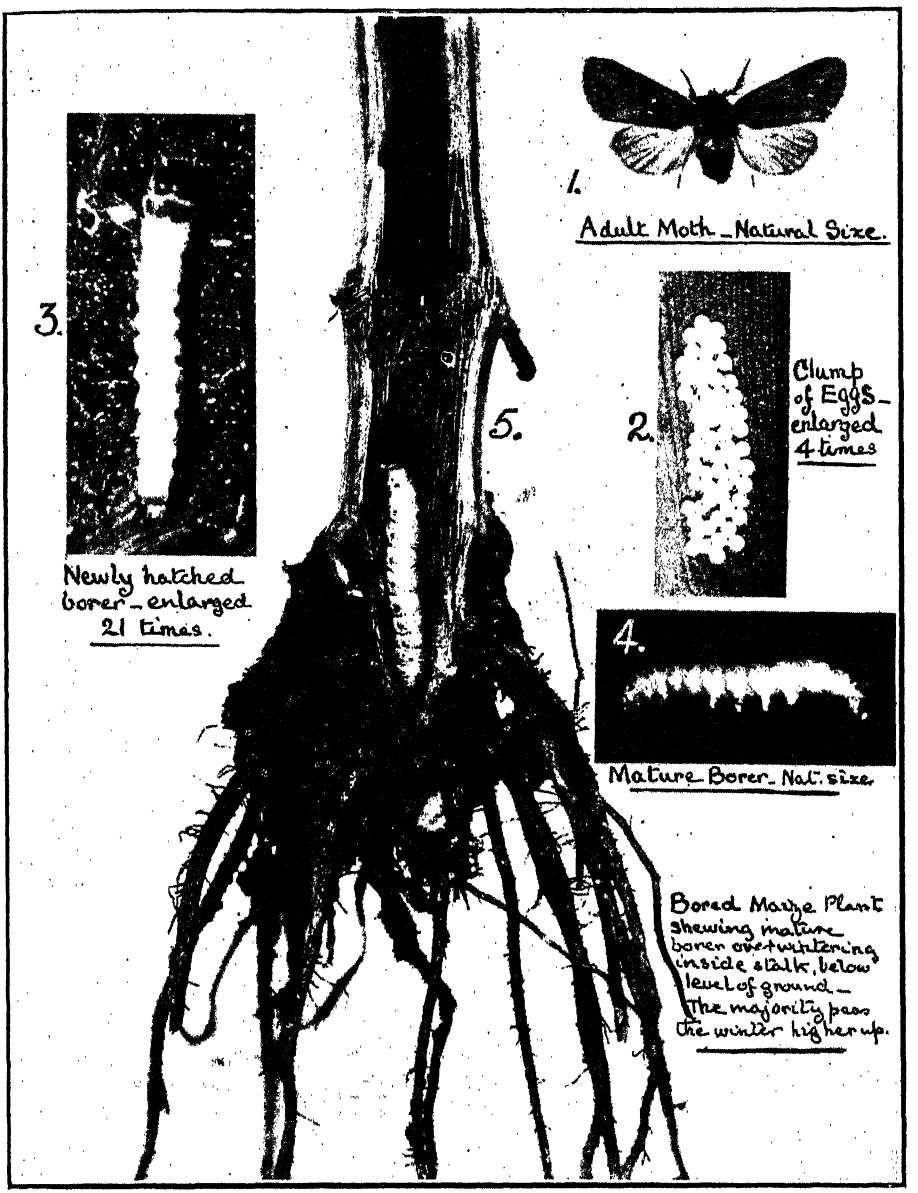
The earliest actual record in Rhodesia of the emergence of a moth of the over-wintering brood is 28th October. This was from a larva found in a kale stump in June. The moth was dwarfed, and the unusual food may have had some effect. From stalks collected in the winter, the great majority of moths have emerged in late November and early December. Of these, the greatest portion have appeared in early December. The latest record is 12th January. It appears that the moths of the winter brood emerge somewhat later in Rhodesia than in the Cape, as Mally states that the bulk of the moths are on the wing in November in the neighbourhood of Grahamstown. Mr. William Moore, late Lecturer in Entomology at the School of Agriculture, Potchefstroom, also gives the second and third weeks of November, "or sometimes later, depending upon the season," for the appearance of the moths. Possibly the later date, on which continuous rains generally commence in Mashonaland, may have some influence.

It may be stated, then, in general terms that in the neighbourhood of Salisbury the first, or summer, brood lasts, roughly, from the end of November to late February, and the second, or over-wintering, brood from late February to the end of November. The following diagram will, it is hoped, give the reader at a glance a fair idea of the duration of the various broods throughout the year:—

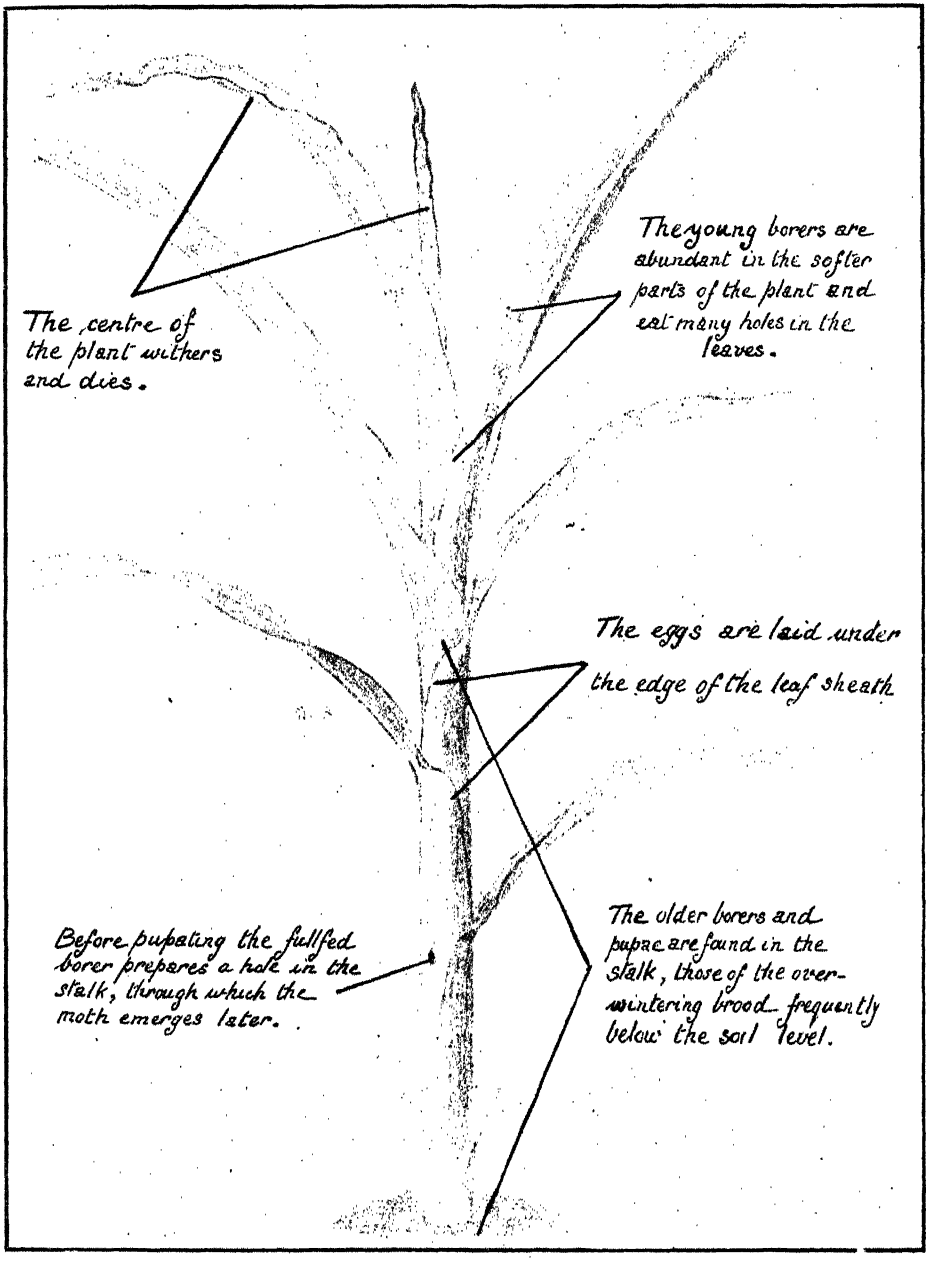


Food Plants.—The maize stalk borer is known to attack freely maize, kaffir corn, broom corn, sweet sorghum and other succulent varieties of sorghum. It has been recorded also from sugar cane and geranium by Fuller in Natal. In Southern Rhodesia an adult specimen has been bred from a kale stump, but the caterpillar had obviously migrated, when partially grown, from maize near by. In addition, borers indistinguishable from the caterpillars of this species are sometimes found in Napier fodder (*Pennisetum purpureum*), but adults have not yet been secured from this plant. As the borers mentioned have always corresponded in size with those found in maize, at the same time there appears, however, little doubt that they belong to the same species. The attack on the fodder is quite negligible as far as injuring that crop is concerned, but might be of rather more importance in providing a supply of moths to attack maize, etc., in the spring.

The hay crop known as Sudan grass (*Andropogon sp.*) was attacked to an overwhelming degree by a borer at the Government experiment plots at Salisbury during the past season, corresponding with the second brood of the maize borer in an adjacent plot. The most careful microscopic examination failed to reveal any difference between the two borers, and those from the Sudan grass bored readily into maize when placed upon a stalk of that plant. The borers in the two crops kept pace with each other as long as the Sudan grass was sufficiently succulent, but the food supply in the latter gave out before the caterpillars were full grown. The latter, after completely hollowing out the stalks down to the root, had no alternative but to leave and seek food elsewhere. Another species of andropogon, native to Southern Rhodesia, and known to certain of the natives as "msemi," was also attacked at the same time. Mr. J. A. T. Walters, Asst. Agriculturist, informs the writer that this grass is botanically practically identical with Sudan grass, but many of the stalks in the experiment plot were nearly half an inch in diameter, and thus contained enough substance to mature the borer. The distribution and occurrence of this grass in various parts of the Territory appear not to be very well known, but,



The Maize Stalk Borer, Plate I.



The Maize Stalk Borer, Plate II. *N.B.*—Somewhat diagrammatical.

if present in any quantity near maize lands, it would undoubtedly prove a complicating factor with regard to borer. Andropogon is very closely related to sorghum, and the attack on these grasses is, therefore, not surprising. The only point that seems strange is that eggs should be laid so freely on a grass, like Sudan grass, that is incapable of supporting the borers to maturity.

The maize borer being native to Africa, considerable attention has been given in the past to the matter of native hosts. It would seem, therefore, that Napier fodder and the allied species, such as "ufufu" grass, constitute native hosts in which the insect can mature, whilst any native species of andropogon or sorghum of sufficient substance would also serve the same purpose, being apparently far preferred by the insect to the various species of pennisetum.

Distance Covered by Female Moths in Search of Food Plants.—The amount of ground covered by the gravid female in order to find suitable plants on which to lay her eggs is obviously of considerable practical importance, more especially in connection with the question of co-operation in measures of control. That the female moths shew little tendency to wander when once they have found a crop in a suitable condition for egg-laying is natural, and is also supported by observation in the field. They are, however, provided with considerable powers of flight, and, under the stimulus of a desire to lay and the absence of food plants in their immediate vicinity, there is no reason to believe that they will not cover considerable distances. It would be an extremely difficult matter to ascertain the limit of their powers in this respect, but numerous cases have been noted where a crop has been heavily attacked by borer, the parent moths of which must apparently have "hatched out" well over a mile away. Indeed, many outbreaks would be inexplicable on the assumption that the females will not travel more than a few hundred yards from the spot where they were bred. The writer is, therefore, of opinion that neglected lands situated within a radius of a mile, and possibly more, may prove a menace to the careful farmer, but would make it clear that this is an opinion, and not a proved fact. The matter will be referred to again when considering the influence of time of planting on borer in the maize crop.

Effect of Borer on the Plants.—The greatest damage is done to the crop by the borers of the first brood. First of all, the young borers feeding in the unopened leaves perforate these with holes which have a characteristic appearance when the leaves open. When the young borers are numerous, as is frequently the case, a considerable amount of damage is done to the tops through direct feeding, and the plant is very much fouled with the excrement of the insects. Later, the operations of the borers in the stem commonly cut off the supply of sap, and the top withers away entirely. The plant sometimes attempts to rectify matters by growing suckers from below the point of injury, but, as may be expected, a plant bearing a cob of any value is not produced in this way.

The borers of the second brood, as a rule, attack the plants when they are well grown and have sufficient strength to resist damage, and so do not have so great an effect on the crop as those of the first brood. On the other hand, numerous instances have been brought to the notice

of the writer in which the attack of the second brood has been so overwhelming that very serious damage has been done to the crop, the loss being estimated up to 75 per cent. This has frequently happened in the case of crops planted about Christmas time, or later. It is obvious that such attack on late planted crops is due to borer moths having bred out in great numbers from some earlier crop than the one attacked, and this must be borne in mind in seeking measures by which such loss can be prevented.

Influence of Time of Planting on Borer Attack.—It has long been the practice of farmers in some of the older settled portions of South Africa to plant late, in order to avoid heavy loss from borer. It is obvious that if planting can be postponed until after the majority of the moths of the spring brood have emerged and laid their eggs, or have perished without doing so, the crop will not be attacked to the same degree as it would have been if ready to receive eggs when the bulk of the moths were on the wing. In Southern Rhodesia the question is quite frequently settled for the farmer by the late arrival of the rains, and all other considerations are naturally set aside for the necessity of getting the crop in as soon as possible. It is, in fact, probably owing to this lateness of the planting season that the loss from borer in this territory is not very much greater than is actually the case. Where, in favoured situations, crops are planted in early November, they are sometimes completely ruined by borer, whilst on the same farm the December plantings may be very lightly infested.

If the reader has followed the account of the life history of the borer, it may strike him as curious that, whereas the bulk of the moths are stated to be on the wing in December, plantings in the early part of that month should as a general rule be comparatively free from attack. The writer himself was puzzled by this apparent discrepancy in logic at first, but observation in the field eventually supplied what appears to be the necessary explanation. Observation, in fact, indicates that the moths do not, as a rule, lay eggs on the young plants until they have attained a certain size, usually about twelve inches in height. As already stated, the eggs are laid between the leaf-sheath of the plant and the stalk, and possibly a certain development of the latter is essential before the moth can obtain the necessary foothold. It will be readily seen that a plant a few inches high does not afford the same mechanical conditions. Eggs, in point of fact, appear not to be generally laid until the plants have been three weeks or more above ground in a favourable season, and, putting the time occupied in germination at about four days, it follows that a crop planted (say) on the 7th December would not be in a condition to receive eggs before about 1st January, by which time the danger is, as a general rule, largely over.

For the past five years weekly plantings of maize have been carried out each year at Salisbury, commencing some time in October and continuing until the end of the year. The results have been consistent, and indicate that a date approximating 27th November marks the dividing line between heavy and light attack, but that it is safest to plant after the 4th December. How far this would apply to other parts of the Territory is not known.

The question of time of planting is worthy of consideration from

another point of view. Certain reasons have already been given for the belief that, in the absence of food plants in the immediate vicinity, the female moths will cover considerable distances in order to lay their eggs. If all lands could be planted at the same time, it is likely (1) that all would benefit according to the date of planting, and (2) that each would benefit according to the thoroughness with which the stalks of the previous crop had been destroyed. This, of course, does not occur in practice, and variation in the time of planting may bring about the situation that moths emerging on an uncleaned piece of land, which at the time bears no crop, may be impelled to move over to the nearest land where the crop is more forward.

In this way a careful farmer may suffer from the negligence of his neighbour. This has been the only apparent explanation of several cases of serious damage from borer in well-cleaned land. The farmer in such cases may find his loss all the harder to bear, because his neighbour, who did not burn his stalks but planted later, may have suffered very little from the borer he bred out for the careful farmer's benefit. Under such circumstances, wherever it is practicable, planting should be postponed until December.

Natural Checks on Increase.—(1) *Parasites.*—Whilst no parasites have been reared from the maize borer in Southern Rhodesia, entomologists in other parts of South Africa have recorded the destruction of a certain percentage of the caterpillars by this agency. Near Grahamstown, in 1903-4, Mally reared three different species of parasites from the pest, and secured a fourth species in 1904-5. All these were attacking the summer brood, and their combined efforts were apparently of very little effect in reducing the numbers of their host. Moore records a species of parasite (*Braconid*) which he estimated to destroy from 2 to 22 per cent. of the borers over-wintering in the maize stalks at Potchefstroom.

(2) *Enemies.*—Ants have been recorded by both Mally and Moore as attacking and destroying the borers in the stalks. Mally's record is a single observation by his assistant, Mr. Sydney Wood, and the species is not stated. Moore's record is of a species of driver ant, *Dorylus helvolus*, which is very common in Southern Rhodesia. These ants spend their time ranging the soil in search of insects which they use as food, and are great enemies of such grubs and caterpillars as live in the soil. On several occasions the writer has found the heads of ants of this family in empty borer tunnels in maize stalks at Salisbury, but has never witnessed an actual attack on maize borer. Moore estimates that at Potchefstroom from 1 to 11 per cent. of the over-wintering borers are killed by these ants. At Salisbury, a species of ant of entirely different habits and appearance, namely, **Pheidole punctulata, Mayr, race atrox, Forel*, is very common in bored maize stalks, inhabiting the empty tunnels, even whilst the plant is still green. The writer has been unable to establish the fact that this ant is an enemy of the borer, but it is significant that whilst living borers have never been found in the same cavity as the ants, the heads of mature specimens occur not infrequently in such situations.

* Kindly determined by Dr. G. Arnold, curator of the Rhodesia Museum, Bulawayo.

fact, almost entirely deserted by the borers during May. Unless these borers happened to find a convenient plant of sufficient substance in which to complete their growth, it is to be presumed that they perished. As Sudan grass is not known to grow a very much thicker stem than the crop at Salisbury, even under conditions of considerably more fertile soil, it would appear at first glance that the crop is more of the nature of a trap for the borers than an alternative host. It must be noted, on the other hand, that the crop observed was heavily infested, each stem containing several borers. Further observation may perhaps shew that one borer can be matured in each of the thicker stems. Sudan grass is, however, a hay crop, and if cut off and turned into hay, say in April, it is quite improbable that any borers would mature in the stubble.

Borers are found in the stalks of maize, kaffir corn, etc., down as far as the roots, and the whole stalk must, therefore, be destroyed. If the stalks are cut off above ground, a considerable percentage of the grubs may escape destruction. Growers must also realise that where lands belonging to different owners lie near or adjacent to one another, as is frequently the case, *co-operation in stalk destruction is essential;* otherwise moths, bred out from the uncleaned land, may pass over and lay eggs on the crop of the more careful farmer, with the result of discounting all his efforts to secure a clean stand.

In carrying out the destruction of the stalks, the most convenient method of procedure under our present system of handling the maize crop is to wait until the latter part of the winter, when the stalks are dry and burn easily. The stalks may be either grubbed out with a hoe, or chopped off *below the surface of the ground* with a chopper, and piled in heaps about the land.* The cores left by the sheller, which commonly contain a small percentage of borer grubs, may be added to the heaps, and the whole thoroughly burnt under supervision. This should be carried out not later than the 1st of October. The ashes form a useful fertiliser for most maize lands, and should be scattered about as much as possible.

In addition to cleaning up the main lands in this way, attention should be directed to other sources of infestation, such as small plots of maize near the kaffir quarters, plants in the kitchen garden, etc. The aim, in short, should be to eliminate every possible breeding place. The more thoroughly the cleaning up process is carried out, the better will be the results obtained.

Summary.—The maize borer is the larva or young of a night-flying moth. Two broods occur during the year, the moths of the first emerging in late November and early December, and of the second about the

* Mr. C. W. Mally, Entomologist for the Cape Province, has recently invented an implement for cutting off the maize stalks below the surface of the ground, and so saving much labour. The main feature of the machine, which may be obtained to cut one, two or three rows at a time, is a series of curved knives which travel along the rows beneath the surface, severing the roots. The severed stalks are then raked together for burning by a large rake, drawn by mules or oxen This implement is stocked by Messrs. Holmes & Son, 9 Von Weilligh Street, Johannesburg. A specimen of the two-row type has been ordered for the Government Experiment Farm, Gwebi, and will be tested during the coming season at that institution.

end of February. The borers from the second brood live over the winter in the stalks. Control measures consist in (1) not planting too early—the first half of December is usually the best time; (2) burning the stalks during the winter.

EXPLANATION OF PLATES.

Plate I., Fig. 1. Adult moth of Maize Borer.
2. Clump of eggs on inside of leaf-sheath of maize plant, enlarged 4 diameters.
3. Newly hatched larva of Maize Borer, enlarged 21 diameters.
4. Full grown Maize Borer, natural size.
5. Section of borer maize stalk, shewing a borer hibernating at base of stem below the level of the ground. A considerable percentage of borers hibernate in this position, but, unless the stalks of a crop are unusually small, the majority are found above the ground level.

Plate II. Diagram illustrating various facts connected with the life history of the borer, and its effect on the plant.

Report on Crop Experiments at the Government Farm, Gwebi,

SEASON 1916-17.

By Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture.

PART II.

Rotation Experiments.—The series of rotation experiments devised two years ago has been continued one stage this year. It will take four years, in some cases six years, to conclude these experiments, and it is, of course, impossible to see any definite results yet, but it may be explained that the object is to ascertain as definitely as possible the relative influences of various side crops on maize. Maize is, of course,

the principal element in all the rotations, and it is introduced in four seasons out of six, three out of five, two out of four and two out of three, while for purposes of control maize is also grown continuously without change. Not until the cycle is completed can definite conclusions be come to as to the most advantageous sequence of crops. As, however, careful records are kept of each plot, it will perhaps be interesting to many readers to learn what results have been obtained under ordinary farming conditions, and how the crops have been grown. It is fully realised that these results are by no means better than the average farm on the red soils of this country can produce, and indeed this year, owing to the unfavourable distribution of the rainfall, the crops are all round materially below the average for the farm. Many farmers are no doubt familiar with the crops grown, but for those who are not, details of the treatment given may prove instructive. Notes on these rotation plots are, therefore, included with other reports under the separate heading of each particular crop.

Velvet Beans.—For the rotation experiments, two leguminous crops are available—velvet beans and ground nuts—and the former has been mainly employed, the resulting fodder being required for the stock on the farm. Some experience has thus been gained regarding what may be expected from this crop under the ordinary conditions of the farm.

Similar treatment was accorded all the plots, the land having been once ploughed after the preceding crops, rolled and disc harrowed during the winter, and drag harrowed before the seed was put in at the end of November, using 25 lbs. per acre in drills 3 feet wide and 12 inches between the plants. Subsequently the crop was hoed twice and hand hoed twice. The crop grew normally and seemed to feel the drought less than others. The cost of seed and operations was £2 2s. 4d. per acre, which left a handsome return, taking the hay at 80s. per ton and seed at 20s. per 100 lbs. Seed being required for distribution, it is allowed to ripen, the crop being cut high for hay in April and the beans gathered later, otherwise a heavier yield of fodder would result. It is not yet possible to deal with the effect in the rotation, the cycle of the experiments not yet being complete.

A further experiment with velvet beans had for its object the determination of the relative profits in growing the crop for hay only, for seed only, or for both combined, and in the latter case the most appropriate time for doing so. The crop was treated as described above until harvest. One plot, A, was cut for hay alone on 21st March, when no pods had yet matured, and all was made into hay, yielding the heaviest return in this respect, but, at the price allowed for the seed, not the most profitable return. Another plot, B, was cut on 5th April for hay, but leaving the basal pods to ripen on the stalks, which were left about 6 inches long for this purpose. This yielded, as shewn, a somewhat heavier total, and a much better pecuniary result. A third plot, C, treated similarly, but cut three weeks later on 26th April, gave considerably heavier totals and the best profit. Finally a plot, D, was allowed to mature its seed completely, which was harvested with the intentional loss of the entire hay crop, to ascertain the total yield of seed. The figures are shewn in the appended table.

The third plot undoubtedly gives the most satisfactory returns, and also proves the best means of harvesting. When a fair amount of pods are developed, the crop is cut by means of sickles well above ground, leaving the lower more woody stem with clusters of pods attached. The leafy runners are readily left in windrows to dry, and collected on a wagon following the drills without damaging them or the pods, which are left to ripen, and are gathered a few weeks later much more easily than they would be from the entire plant. This method has much to commend it where seed is desired. The relative profitableness must depend on the price taken for seed, but that shewn is a moderate figure and the present normal price.

VELVET BEANS.

Previous Crop.			Yield in Pounds.		Value of Crop per Acre.
			Seed.	Hay.	£ s. d.
Rotation Experiment—					
Maize	III.	12-1	318	1,700	6 11 6
Oats	III.	13-6	282	1,550	5 18 4
Maize	III.	14-11	275	1,400	5 11 0
Maize	III.	17-21	333	1,425	6 3 8
Harvesting Experiment—					
Maize	A	...	0	1,575	3 3 0
Maize	B	...	275	1,350	5 9 0
Maize	C	...	425	1,556	7 7 6
Maize	D	...	565	0	5 13 0

A variety of velvet bean, known as Laing's white velvet bean or Kudu bean, and peculiar in being largely free from the black stinging hairs on the pod of the ordinary Florida variety, was given a trial. The crop grew as well as the other kind until about 20th April, when a blight appeared on all the plants, which affected the leaf and destroyed the hay crop, only 280 lbs. of seed alone being harvested per acre. The disease did not attack the Florida velvet bean.

Although less than it would have been in a more favourable season, fair results from manurial trials with velvet bean hay were obtained. As in other experiments, kraal manure gave the heaviest return, increasing the yield by about 50 per cent., whereas little or no result was obtained from the use of other artificial fertilisers. In this case it is somewhat surprising that lime appears to have had no beneficial effect, as generally leguminous crops of this nature are regarded as calciphile. A portion of the crop was cut whilst in full growth, and yielded green fodder at the rate of 5,400 lbs. per acre. The velvet beans were treated as described above. The crop was pulled by hand on the 26th April, and left in small heaps to dry; afterwards these were transferred to larger ricks and ultimately baled. The following results were obtained:—

Fertiliser Applied.	Yield of Velvet Bean Hay per acre.
7 tons kraal manure	2,400 lbs.
100 lbs. Safco Rhodesian Maize Fertiliser	1,760 ,,
2,000 lbs. lime	1,600 ,,
Nil	1,600 ,,

GROUND NUTS.—Ground nuts gave the disappointing yield of only 640 lbs. per acre, and little over half the average yield of the farm in past years. The seed was drilled at the rate of 25 lbs. per acre on the 28th November, in rows 3 feet apart, with a planting distance of 9 inches to 12 inches. No manure was applied, and the crop was hoed three times before being harvested on the 20th April.

The crop began well, but evidently the lack of rains hindered the development of flowers and nuts, hence the exceptionally light return this season, a feature unfortunately observed this year also in the Enterprise district and other parts where this crop is largely grown.

A crop of ground nuts, variously fertilised, was put in on the 9th December, drilled with a planter 3 feet wide and the seed 12 inches apart, using 25 lbs. of shelled nuts per acre. The crop was hoed in December and in the beginning of February, and grubbed by hand in the middle of January and at the end of March, and the crop was lifted during the first week in May. The resulting straw, which was used for fodder, was not weighed, but would average about 300 lbs. per acre. Ground nuts are a crop known to do well on the poorer soils, and on one of average fertility, such as they were grown on, they did not seem to respond much to the application of artificial fertilisers. The fact that artificial fertilisers and lime give actually less return than the control plot can hardly be interpreted as proving prejudicial action on their part, as the differences are comparatively slight. Benefit was only obtained from the use of kraal manure, and in this instance it gave an increase of only $1\frac{1}{2}$ bags more than that yielded by the control plot, viz. :—

Fertiliser Applied.	Yield of Ground Nuts per acre (in lbs.).
7 tons kraal manure	840
Nil	720
100 lbs. Safco Rhodesian Maize Fertiliser ...	710
2,000 lbs. lime	680
100 lbs. Bain's Potato Fertiliser	675

The question is frequently asked by farmers whether it is necessary to assist the flower of the ground nuts to bury itself in the soil prior to the maturing of the bean. Experience seems to differ considerably on this point. On sandy soils it is quite possible that this operation can be performed without assistance, but on the heavier red soils on which ground nuts are now being more largely grown than hitherto, it would seem as if some assistance might be necessary, to enable the tender plant to pierce the hard surface of the ground. The desirability also

of growing on ridges, instead of on the flat, is frequently discussed. The object of the following simple experiment was to gain some insight on these points. To this end, four acres of ground nuts were planted on the 27th November, 1916, in drills 3 feet wide, with 12 inches between plants, at the rate of 25 lbs. of shelled seeds per acre. Until differences of treatment were instituted, all the ground was twice cultivated and once hand hoed. The crop ripened in the middle of April, and was pulled by hand, the weights from each plot being afterwards carefully ascertained. The crop did fairly well throughout, although rain was needed at the critical time of podding, but for which the crop would have been heavier. One plot was ridged at the time of planting, and the ridges earthed up at each cultivation, so that the plant continually grew on this ridge. This plot yielded the smallest return. A second plot was planted on the flat, and constantly kept flat, not being ridged, and this plot did much better than the first mentioned one, although possibly if the season had been very wet the results might have been the reverse. A third plot was planted on the flat and subsequently ridged up, with the object of throwing the earth nearer to the flowers when podding commenced. This procedure gave better results. On the fourth plot, following a practice employed in certain parts of the United States, the ground nuts were planted on the flat and not ridged up, but directly the crop came into flower, loose soil, to the amount of two double handfuls, was dropped into the centre of each plant by hand. This operation involved a little extra labour, but the net result was the best of the four, the returns being as follows:—

(1)	Planted on ridges and ridges maintained ...	750 lbs. per acre.
(2)	Planted on the flat and cultivated on the flat	860 ,, ,,
(3)	Planted on the flat and subsequently ridged	900 ,, ,,
(4)	Planted on the flat and earth thrown on plants at flowering	960 ,, ,,

The fair conclusion is in favour of putting loose earth close to the plants or on them shortly after flowering, whatever means may be taken to achieve this result.

Sunflowers.—Sunflowers are steadily growing in public esteem as a profitable crop, the present high prices, which are likely to continue for a few years, being an attraction, and in spite of difficulties regarding freight, markets have so far been found at highly remunerative prices for all that Rhodesia has produced. Following on maize, the sunflowers were drilled 3 feet apart, planted somewhat thickly, to be thinned afterwards to 12 inches between the plants. The amount of seed used was 8 lbs. per acre; the crop was hoed twice and thinned once by hand. From the very commencement, the plot that was kraal-manured shewed distinct advantage, and the other plots yielded but little benefit from the applications given. The crop flowered in the beginning of March, and by the middle of April shewed signs of ripening somewhat irregularly. The crop was cut between the middle of April and the middle of May, the ripe heads being taken as they matured, cut and laid on the ground to dry, and removed when all had

been harvested. Owing to the season, a considerable proportion of the grain did not fill out, but nevertheless the return on the nil plot of 540 lbs. was much the same as the corresponding plot of the previous year, viz., 571 lbs. The outstanding result is the value of kraal manure for such crops, whilst lime appears to be ineffective, and artificial fertilisers not profitable. These conclusions might have to be modified in a season of good rainfall. In this connection it is to be remembered that sunflowers have shewn themselves to be a useful crop to plant before maize, which appears to benefit very noticeably on land that has carried sunflowers. The results obtained were as follows:—

Fertiliser Applied.	Yield of Sunflower Seed.
7 tons kraal manure	960 lbs.
100 lbs. Safco Rhodesian Maize Fertiliser ...	620 ,,
2,000 lbs. lime	600 ,,
100 lbs. Bain's Potato Fertiliser	560 ,,
Nil	540 ,,

Although sunflowers are recommended as a crop to be planted immediately preceding maize, which appears to benefit by this procedure, they have not done well themselves when sown to new land. On a trial on previously uncultivated ground, unmanured, the sunflowers planted in the middle of December and harvested during May shewed very great irregularity, both in size and in maturity, and eventually yielded a crop of 415 lbs. of good seed per acre.

Tobacco.—In conjunction with a committee of the Rhodesia Tobacco Co-operative Society, experiments were conducted with the object of finding a variety of tobacco suitable for growing on the red soils of which the farm consists. No attempt was made to produce a bright leaf, but rather it was hoped to grow a good mahogany-coloured pipe tobacco on this soil of heavier weight per acre, and at cheaper costs in curing, than is secured on the light tobacco soils, and by the use of flue-barn. Entire success at the first attempt was not to be expected, but good progress has been made, and the way prepared for a further step in this direction in the coming season. The seed of the eight varieties recommended was obtained in the Union through the assistance of the Society and the Department of Agriculture, and was sown on the 9th October in the usual manner, and planted out on 2nd December, considerable re-planting being necessary three weeks later, particularly of the Boyd and Yellow Pryor varieties, and the former was the weakest throughout.

The best stands obtained were those of Warne, Goldfinder and Hester, and the first named was the most forward variety throughout, being ready for topping at the end of January. At the end of February, Warne began to ripen, but the leaves were small and narrow, and the yield obviously less than the others. The Burley varieties withstood the dry spell better than the others. Warne, Pryor and Goldfinder were the first to be harvested.

The curing was conducted in a grass shed made for the purpose, and in the open, and the exceptionally late April rain damaged a certain amount.

The actual weights of cured leaf per acre harvested are as follows:—

Burley x Swazi	800 lbs. per acre.
Pryor	780 ,, ,,
Goldfinder	760 ,, ,,
Yellow Pryor	750 ,, ,,
Hester	750 ,, ,,
Swazi x Burley	640 ,, ,,
Warne	564 ,, ,,
Boyd	450 ,, ,,

The cost of operations worked out in this case at 3d. per lb., and details will be read with interest, although these vary very considerably with each individual grower:—

Preparatory cultivation	£0	4	6	per acre.
Seed	0	2	0	,,
Seed beds	0	13	2	,,
Planting and re-planting	0	10	0	,,
Cultivation	0	7	0	,,
Topping and suckering	1	10	0	,,
Reaping and curing	5	5	0	,,
	£8	11	8	

The average value of the leaf produced was only 4d. per lb.

The methods adopted for curing can, on the experience gained last season, be improved in certain particulars, and in the coming season it is proposed to give special attention to the effect of different fertilisers upon the quality of the tobacco.

Forage Crops.—A series of plots have been laid down to permanent forage crops side by side for the purposes of comparison, and to learn the best modes of treatment and the purposes for which they seem adapted. These plots are of a permanent character, and will be reported upon from year to year.

Napier Fodder.—Roots of Napier fodder were planted in rows 6 feet by 6 feet, but it is probable that this espacement will, in view of the results obtained in other experiments, be reduced. Napier fodder has made the strongest growth of any of the fodder crops under examination. In the first season it established itself well, and in the middle of April there was sufficient fodder to provide good pasture, though not enough to cut. During June and July the plot was grazed by sheep and cattle, and in August there was a considerable re-growth, the plants having stooled out well, and become strongly established for the coming season.

Espacement.—Napier fodder is a comparatively new crop still in Rhodesia, and there is no experience of farming with it in other countries to guide us. Considerable differences of opinion, therefore, exist as to the most suitable planting distances. To gain some information on this point, 3½ acres were planted with Napier fodder two years ago. In the first season, no definite results could be looked for, as the plants were all small, and had ample growing space. In the second season, however, much more definite information has been forthcoming,

even although a considerable amount of misses had to be planted with young slips. Next year it is hoped even more clear results will be forthcoming from these plots, which will be conducted as long as the Napier fodder remains useful, a period which no experience has yet fixed. No attention was given to the crop beyond hand-hoeing and filling the blanks as stated, and it was cut for ensilage in the middle of April, and put into a pit along with sweet potato tops, as it was found that this mixture rendered the silage more attractive to cattle than the Napier fodder by itself. Certain of the plots are planted close, with a view to being grazed, and they were more or less equal in weight; these were all cut together, and the average weight taken. Some of the stools in the wider espacement cover an area of 4 to 6 feet, and the plants grew to a height of 10 or 12 feet. It would probably have been better to make two or three cuttings, converting part into silage and part into hay, but for the purposes of this experiment, where the object was to ascertain the relative amounts of fodder grown according to distance of planting, one cutting was considered more instructive, and naturally the plants put in wide apart are bigger and healthier than those planted close together. Occasional cultivation is obviously desirable with this crop, but, owing to the size of the stools, it is necessary to leave some distance between them. The best planting distance, therefore, for the crop, if it is to be cut, appears to be 4 feet by 2 feet, as shewn by the following returns:—

Planting Distance of Napier Fodder.		Yield of Green Fodder.
6 feet by 6 feet		5,400 lbs.
4 feet by 4 feet		9,000 ,,
4 feet by 3 feet		10,800 ,,
4 feet by 2 feet		12,100 ,,
3 feet by 1 foot		
2 feet by 2 feet	average	11,700 ,,
2 feet by 1 foot		
1 ft. 6 in. by 1 ft. 6 in.		

Further interesting particulars regarding Napier fodder are contained in the yields obtained from a plot of three acres, now three years old, from which material for roots for distribution to farmers has been taken each season. During last year this plot yielded 100,000 roots off the three acres, and afterwards 8,400 lbs. of green fodder per acre.

Umfufu.—Compared to Napier fodder, this other native plant has given much poorer growth, and, as the plants do not require so much room, will next season be thickened to a space of 6 feet by 3 feet instead of 6 feet by 6 feet. The crop is, however, well established, and further comparisons will be interesting.

Indian Cane was also well established during the season, but made little growth, though likely to come on well with the first rains. It is noticeable that this crop withstood the winter frost better than any of the other fodder crops tried.

Cow Cane.—Some difficulty has been experienced in propagating roots or slips, but this will be planted out alongside the others early in the coming season.

Guinea Grass was sown broadcast by hand, but entirely failed to germinate. This is somewhat extraordinary, as the grass is a native one. Where propagated from slips, however, it has grown well, though it is of a finer character than the other grasses, and probably more suited for hay than for ensilage or green forage. The crop, cut, yielded hay at the rate of 2,400 lbs. per acre.

Uba Cane was well established, but provided no fodder the first season. During the winter it was grazed by cattle and sheep, as there was not sufficient growth to make it worth cutting. It sprouted early in the season, and is likely to prove useful on this account.

Molasses Grass.—This grass has increased from small beginnings, and now there are two-and-a-half acres under cultivation at the experiment farm, and it is proposed to considerably increase this acreage in the coming season from seed obtained from the original patch, but it is too early yet to be able to distribute the seed or plants of this very promising species to the public. The molasses grass is a perennial, and has stooled out very strongly from the original plants, every joint rooting when it comes in contact with the ground. It grows rapidly and densely, and, if cut for hay, would yield a crop of perhaps three tons per acre. In order to obtain seed, however, it has been carefully preserved. Unfortunately it seems characteristic of this grass that it seeds very late in the season, commencing last year to flower only at the end of May, and, therefore, it is not likely to ripen seed except in seasons when, or places where, early frost can be escaped. Some molasses grass planted from slips last year unfortunately failed, owing to the summer drought, but that propagated from the little seed available survived and came on well. It grows rapidly, and produces a dense mass of succulent feed, and will probably do best if cut twice in the year for hay, and then grazed in the winter. It withstands frost well, and is better in this respect than Napier fodder. It seems likely also to prove very suitable as a pasture, although the area available for experiment does not admit of it being tried in this way yet.

Sudan Grass.—This new annual grass seems likely to prove of very great value in this country; it has done better on the red than on the black soils, and better on old lands than on newly broken ground. Though only an annual, it will probably yield two good crops of hay and grazing thereafter. Ten acres were sown, at the rate of 12 lbs. to the acre, with a machine drill, in rows 8 inches apart, on the 29th November. No manure was used. In the end of December, the crop was 6 inches to 8 inches high. The first crop began to ripen in the beginning of March, and would have yielded a very fine crop of hay if cut in the middle of February, but was purposely allowed to mature to seed, and then yielded 188 lbs. of seed and 2,400 lbs. of straw per acre. The second growth was cut for hay, and yielded a further 1,470 lbs. weight per acre. Both the above-mentioned straw and the hay were greedily eaten by stock. After the second cutting, the grass continued to grow rapidly, and afforded good grazing for sheep during the last weeks of May, when it was cut down by frost and killed. It is, therefore, not suited as a winter grazing. A portion was not cut at all, but grazed, and proved

well adapted for this form of treatment. This grass, though somewhat coarse, may be compared with oats or boer manna as a summer hay crop, and appears to be superior to both in yield, whilst it is very much stronger than teff, the other annual grass which has of recent years been so largely introduced into this country, and has also proved useful. The dry spells of last season proved disastrous to teff grass, which has, however, virtues of its own, and is not likely to be entirely displaced by other hay crops.

Teff.—This year, owing to the abnormality of the season, teff grass yielded, on the whole, very light crops. Such a quick-growing plant is necessarily dependent on sufficient rain during the time of its growth, and the plots under report only received 8.77 inches during that stage. For the same reason, the influence of the manures used cannot be regarded as quite decisive. Teff was sown at the rate of 6 lbs. per acre on the 13th January, 1917, and following a crop of maize. When mature, it stood only about 12 inches to 15 inches high, but was allowed to ripen for seed, instead of being cut for hay. The following results obtained for weight of seed and straw, in spite of the want of water; the fertiliser seemed to exert some effect, the Rhodesian Maize Fertiliser more than doubling the crop, whilst lime was also not without result:—

Fertiliser Applied.	Seed.	Straw.
100 lbs. Safco Rhodesian Maize Fertiliser ...	460 lbs.	500 lbs.
100 lbs. Bain's Potato Fertiliser	390 ,,	500 ,,
200 lbs. Salisbury General Fertiliser	360 ,,	500 ,,
2,000 lbs. lime	360 ,,	500 ,,
Nil	220 ,,	400 ,,

A Farm Cheese and Butter Dairy.

By R. C. Simmons, Chief of Animal Industries Branch, and G. U. Fripp, Assistant Architect, Public Works Department.

The Department of Agriculture has recently received quite a number of enquiries for plans of dairy buildings suitable for a fairly extensive farm business in butter and cheese, especially the latter. In most instances the enquirers have contemplated using the milk from a large number of cows from several farms.

The plan now submitted has been designed primarily to suit a business of this kind. The most expensive and elaborate item is the cool-room or ripening-room. This we think absolutely essential, as without it the successful ripening of any appreciable quantity of cheese is almost impossible during the greater part of the year. The object of the various fittings of this chamber is to give control of the atmosphere within the chamber both as regards temperature and moisture. Those having any knowledge of the principles governing the ripening of cheese will appreciate the importance of this.

The best way to keep a room cool is first to construct it of materials which are non-conductors of the heat from the earth and from the external atmosphere, and second to exclude the warm outside air from it. These principles were recognised by the early Dutch inhabitants of the Cape, whose houses and mansions were all constructed in accordance with them. An arrangement of draughts, while excellent in a more temperate and moist climate, is by no means the best here, especially as in a dry time it in no way assists to increase the moisture of the atmosphere within the chamber. If one gives the matter a moment's thought it is obvious that the only way to correct excessive dryness of the atmosphere is to exclude the outside air and to take steps to deal with that inside the chamber. In a chamber such as the one under review this can be done by closing all apertures and placing vessels of water within; or by admitting the air only through certain channels (that is to say by one or more of the ventilators in the lower part of the wall) in such a way that it must pass over water in the form of wet sacks or crates of wet shavings or immediately over a vessel containing water, and thus becomes moistened as it enters. In order to keep such a room cool one would open up the ventilators or shutters or both at night and admit the cool fresh air. At sunrise they would be closed entirely, and thus one would imprison the cool air and protect it from the outer heat by the insulating properties of the wall, floor, shutters and roof. Towards the cool of the afternoon the ventilators may perhaps be again opened.

It is desirable that the building, according to plan submitted, should be so situated that the outer scullery door faces north. The ripening-room is then protected from the heat of the midday sun; the work-room is cool in the early morning, the time when it is usually desirable to carry on dairy work, and the drainage arrangement receives the full light of the midday and afternoon sun, which acts as a germ destroyer. Further, in most situations, especially in Mashonaland, the boiler and the drainage arrangements are on the side opposite the prevailing wind, and there is less likelihood of smoke being blown on to the dairy. The whole building should be to windward of the kraals, etc., and at least 50 yards from them.

A small stoep or verandah has been provided for in the plan, and is intended to form a milk delivery or despatch platform, as also a place for airing or drying utensils and clothes. While it is a simple enough matter to keep one's dairy clean in dry weather, it is desirable in wet weather to prevent the boys from the kraal and those who deliver milk from the neighbours and so forth from tramping all over the inner parts of the building. The outer door to the scullery and the verandah will, we think, obviate the necessity for any boys other than one specially appointed dairy boy from entering the work-room.

The principles of insulation are not always very clearly understood. We make no apology, therefore, for emphasising the fact that the air space between the walls is not for the purpose of creating a current of air and must be entirely closed so that it contains dead still air. To have a current of air would destroy much of the advantage to be derived from this system of building. The burnt out coke or coke breeze, as it is called, under the floor is for the purpose of intercepting the heat coming from the earth. The fact that on hot days the earth becomes very warm and that its heat may penetrate up through ordinary floors into a building and increase the heat of the atmosphere within is frequently overlooked. The mixture of dagga and coke breeze laid on the top side of the ceiling serves a double purpose of insulation and protection from fire in thatched buildings. In places where good building stone is available practically equal results would be obtained from well built solid 2 feet stone walls, provided that the floors, windows, ventilators, ceilings and roof were built as indicated in the present specification.

It is realised that comparatively few farmers will be in a position to erect the complete building as shewn on the plan. Nevertheless, we venture to think that much useful information may be gleaned from the plan and specification which may be adapted to less ambitious requirements. A cool room, for instance, on a somewhat smaller scale is a valuable addition to any farm house for domestic purposes apart from commercial requirements. The hot water arrangement, as shewn, would be equally useful attached to a kitchen, bath-room or to the smallest type of dairy. In any case, should the whole plan be more than the farmer cares to undertake, parts of it may be built at a time, and while holding to the general principles involved, it may be modified in many ways to suit individual taste and circumstances.

SPECIFICATION FOR FARM DAIRY AS SHEWN ON PLAN.

Bricklayer and Mason and Plasterer.

Site.—Level off the ground and excavate trenches to the required depths and widths shewn.

Foundations.—Build the foundations of hard bricks, or local hard stone, bedded and struck jointed in 5 to 1 cement mortar. Fill in under all cement floors to bring up to the required level for concrete with hard dry earth or rubble, well water and ram solid. The top 18 inches of the filling under the ripening room to be coke breeze, *i.e.*, burnt out coke.

Ant Course.—Carefully lay throughout a 26 gauge gal. sheet iron course properly soldered at joints, to project about ¾ inch on the external side of foundations, and to be turned up internally 3 inches so as to be bedded into the concrete floors.

Mortar.—The mortar for brickwork above the floor level may be 3 to 1 sand and lime, or it may be ordinary sandy dagga. All arches, sills and all frames built in should, however, be bedded in 5 to 1 sand and cement mortar.

Arches.—All arches to be at least 9 inches deep and 14 inches over the larger openings with a 2½ inch x ½ inch iron camber bar, 12 inches longer than the width of the opening built in to carry the arches.

Sills.—All window sills to be brick on edge bedded and grouted in 5 to 1 sand and cement mortar and laid on 26 gauge gal. sheet iron turned up at the back of the brick sills and finished into a groove in the wood sills of the windows. *Note.*—This is to prevent water soaking down into the brickwork. The brick sills to be set sloping and to project 3 inches beyond the external wall face.

Concrete Floors.—Lay the concrete floors at least 4 inches thick. The concrete to be composed of 5 to 2 and 1 respectively of metal, sand and cement; the metal to pass a 1¼ inch ring. The floor to be floated with a ¾ inch thick coat of 2 to 1 sand and cement mortar, which is to be continued up the face of all internal walls for say 6 inches to form a skirting, and is to be formed with a curved angle with the floor, and the top of skirting rounded and slightly projecting beyond the surface of the plastering above. Carefully lay the stoep, having a slight fall to all outside extremities. Form all steps and gutters as required. *Note.*—In the laying of concrete floors, it is important to follow the following instructions. The work must be done in one job and not piecemeal; never allow one portion to set before completing the whole. The floating coat and skirting is particularly to be done in one job. When the whole of concreting is completed, cover with wet bags or sand, and continually moisten for one week, as it is essential that the floors set slowly.

Brickwork.—All brickwork is to be built in colonial bond, *i.e.*, four courses stretchers and one course headers. The bricks to be well soaked before being laid. All faces of walls to be built plumb and true. The joints not to exceed ⅝ inch in thickness. Beam fill with brickwork up to the underside of thatch. If the brickwork is built in lime mortar

the joints externally can be neatly struck as the work proceeds, and no pointing will be necessary. All walls internally which it is intended should be plastered must have the joints raked out to form a key for the plaster. *Note.*—If dagga mortar is used, then it is advisable to rake out all joints externally and point with 3 to 1 sand and lime mortar.

Plastering.—All walls internally should be plastered to a height of 5 feet above the floor in 5 to 1 sand and cement mortar, and about a week later finish off with a 2 to 1 sand and cement, skimming coat to a smooth surface with a steel trowel. The portions of walls above the cement dado can be plastered in 3 to 1 sand and lime mortar or with ordinary dagga plaster mixed with fine sand and a good proportion of coal tar screened through a fine sieve and finished smooth with a steel trowel for distempering.

Air Cavity round Ripening Room.—When building the brickwork of the ripening room a small piece of hoop iron should be built in every 3 feet, binding the 4½ inch wall to the 9 inch wall. This will considerably strengthen the walling. The 4½ inch cavity is not to be open anywhere, and must be closed up at the top where it meets the roof timbers.

Frames.—Build in all frames as the work proceeds. All frames to have 18 inch pieces of hoop iron screwed on to sides and built into the joints of the brickwork and turned up so as to form anchors. Door frames to have three anchors each side, and windows two. Door frames to have 3 inch iron dowels at feet built into the concrete floors, but not to be carried through the concrete, or the ants will work through.

Air Bricks.—The six air ventilators to the ripening room are to be 9 inches by 6 inches iron air grates which can be opened or shut at will from the outside. The flues to be built right through into the ripening room and closed all round from the 4½ inch air cavity in the walls. The air grates to be bedded in 5 to 1 cement and sand mortar, with a very fine mesh wire gauze at back carefully fixed to prevent the entrance of insects. *Note.*—This is very essential, and, with the ant course as before specified, forms a great safeguard against the attacks of ants either on the material of the building or on the produce stored within it. If six air vents are thought excessive, two on the side of the prevalent wind will answer the purpose.

Hoop Iron.—Build in a strand of hoop iron at the level of the heads and sills of windows to bond together the brickwork. The hoop iron to be tarred and sanded. Build in 5 feet lengths of hoop iron every 5 feet at the top of walls, to be built 2 feet down into the walls, with the remainder left for tying down the wall plate and roof timbers.

Carpenter.

Roof.—The roof to be constructed, as shewn on drawings, of native pole timbers not less than 3 inches thick, all securely fixed at intersections. The wall plate to be 4½ inches by 1½ inches, tied down as before specified. The projection at eaves to be 18 inches. The roof of

the stoep to be supported by a 4½ inch by 3 inch beam on edge over the centre of piers, secured in position by hoop iron lengths built down the centre of piers as specified for the wall plate. Bamboo laths to be fixed throughout as required for thatching, to be at 9 inch centres, securely fixed in position by light wire turned over and stapled at each side of the rafter.

Thatch.—The thatch to be long and coarse, well cleaned and combed, dry, and not less than 9 inches in thickness. Sewn on to the laths with tarred junk. The ridging to be 24 gauge gal. iron 18 inches wide, securely sewn to the thatch with copper wire and arranged flush round the vent tube over the ripening room.

Ceiling.—The ceiling of the working room and scullery to be of 6 inch by ½ inch grooved and tongued match boarding, well cramped up and securely nailed to the beams. A 3 inch stock cornice to be fixed around the edges. The ceiling of the ripening room to be formed of corrugated iron laid on top or securely screwed to the underside of the beams and filled in on top with a 6 inch layer of coke breeze (burnt out coke) and dagga. A 2 feet square ceiling vent to be left in centre of the room, with a 3 inch by 2¼ inch frame and sliding panel made to open and shut as desired. The vent to be covered with gauze and fitted with cords for the purpose of opening and shutting. A 12 inch gal. iron vent tube to lead from the opening in the ceiling and carried through the roof, to be fitted with a terminal, and, where connecting with the ceiling, to be formed into a trumpet shape the required size of the ceiling panel. All as shewn on drawing. *Note.*—This vent tube may be constructed of wood if desired.

Doors.—The doors throughout to have 4½ inch by 3 inch solid frames rebated for 6 feet 8 inches by 2 feet 8 inches by 1½ inches thick stock pine doors or ledged and braced doors made of 6 inch by ⅞ inch grooved and tongued boarding with top and bottom and intermediate braces screwed on. Stock doors to be hung on two 4 inch iron butt hinges; and the ledged and braced doors on 12 inch strong tee hinges. The door of the ripening room to be formed of 6 inch by ⅞ inch grooved and tongued boarding horizontally and vertically in two layers screwed together, having two or three layers of thick brown paper pasted on between the layers. All doors to have 6 inch rim locks. *Note.*—It is essential that the ripening room door should fit closely, and if possible be fitted with a rubber or cloth attachment on the bottom to exclude a draught under the door. A mosquito door, in addition to an ordinary door between the scullery and the work room, would be an advantage.

Windows.—The windows to work room and scullery to have 4½ inch by 3 inch solid frames rebated for six light 14 inch by 12 inch stock casement sashes hung as shewn on two 3 inch iron butts and fitted complete with fastener and 18 inch opening stays. The windows to the ripening room to have 4½ inch by 3 inch solid frames rebated internally for solid shutters made of two layers of 6 inch by ⅞ inch tongued and grooved match boarding with brown paper between similar to the ripening room door. To be hung on 9 inch tee hinges and fitted with casement fasteners and 18 inch stays. The external shutter to be formed of 2 inch by 1½ inch frame with 3 inch by 1½ inch louvre slats at 1½ inch spaces and

housed into frames. These shutters to be hung on 4 inch parliament hinges so as to open right back against the wall, with a suitable fastener fixed to the wall. On the inner side of these shutters a fine mesh mosquito gauze is to be fixed, with a half round bead all around, securing the gauze to the framing. If preferred, the louvred shutters can be substituted by six-light 14 inch by 12 inch stock casement sashes, the same as the other windows, in which case it will be necessary to fix a mosquito gauze and frame between the internal shutter and the external glazed casement.

Mosquito Frames.—The mosquito frames to the three doors of scullery and to the windows internally of scullery and work room to be formed of 3 inch by 1½ inch deal framing halved and screwed at joints and braced as shewn. To be covered with a fine mesh mosquito gauze, secured by a half round bead all around the framing. The doors to be hung with two 12 inch strong tee hinges, and the windows with two 3 inch iron butt hinges. The doors to have some automatic closing attachment, and the windows to have casement fasteners.

Drainage and Plumber.

Sink, etc.—A 36 inch by 18 inch selected sink to be fixed in scullery, with the necessary supports, and a 1 inch draining board to be provided on each side.

Tank.—Build a brick base in 5 to 1 sand and cement mortar to the required height above the ground, so that the tank is placed above the top of the boiler. Place a tank on the base, and connect by an iron pipe to the boiler. The tank is for the purpose of continually keeping the boiler full, as it will re-fill from the tank directly the hot water is drawn off. The tank can be connected with the farm supply if desired, and cold water can also be laid on to the sink.

Drainage, etc.—The floors of the ripening room and work room will each drain in all directions towards and out through the respective doors for washing out purposes. The floor of the scullery will drain all towards a shallow half round gutter running along the wall under the sink, and discharging through an opening in the wall into an open half round gutter outside. A 1½ inch waste pipe will carry the water from the sink through the wall into this same open gutter outside. It will be an advantage if this gutter be constructed to lead 20 feet or 30 feet clear of the building before its contents are allowed to run into any kind of pit or receiver. At the far end of the gutter, if desired, a 9 inch gully about 2 feet deep may be placed. (These are procurable complete with grease interceptor trays.) The gully to be set in concrete with a sump formed all round about 4 inches higher than the iron grating of gully. The gully to connect with a soak away pit by a 3 inch iron pipe. The soak away pit to be made as follows:—A pit 6 feet by 4 feet and 6 feet deep to be excavated and filled to within about 12 inches of the natural ground level with large granite blocks, care being taken to form a hood over the connecting pipe where it enters the pit. The granite blocks to be covered with old corrugated iron, and the pit filled to ground level with earth. Alternatively, at the end of the 20 feet or 30 feet gutter the drainage may be allowed to run into

a movable receptacle, such as a petrol drum, or something of that kind, which may be removed and emptied daily. No closed drain or pipe of any kind should be allowed near the building. While such things are excellent in towns and under constant European supervision, the farmer will be safer with open drains, of which he can view the whole surface, and which with the aid of sunlight and an occasional disinfectant may be kept hygienic.

Boiler.—The boiler to be constructed at some little way from the building, and to consist of a 3 feet by 2 feet petrol drum, built in on a brick base, with firing space under and a flue at back, as shewn in plan. Fire bars may be constructed out of old tyres or the like, and will be found a great advantage. Connect the boiler with an iron pipe and tap to the sink, and connect the boiler to the tank as before specified. The boiler must have a pipe from the top to a height equal to the top of the tank. *Note.*—This is absolutely necessary to let off the steam, or the boiler will explode.

PAINTER.

Painting.—Knot, stop and prime three coats to all external woodwork and paint iron two coats. All internal woodwork built to brickwork, ceilings to scullery and work room and exposed timbers under stoep are to receive two coats of carbolineum. The walls of all rooms internally are to be twice lime-washed.

The Restraining Influence of Cyanide upon Oxidation in Arsenical Dips.

By A. G. HOLBOROW, F.I.C.

Research work, when time and circumstances allowed, has been conducted in the chemical laboratory of the Department of Agriculture in connection with dipping fluids. The main object of this work has been the possible prevention of the chemical change in solutions of arsenic used for dipping. The results published here are not intended

to be conclusive or complete, but are given as an *interim* report, pending further investigations.

The chemical action known as oxidation brings about the formation of arsen*ate* of soda from arsen*ite* of soda. This newly formed compound has been found by others to have only about one-half the tick-killing power of the latter. It is of importance, then, to find the true cause of this oxidation, as a stepping stone in the direction of arriving at a means of its prevention. One method of very practical use of inhibiting this action, and preventing it from attaining great proportions, is the constant agitation of the dipping fluid in the tank by the passing through of cattle at regular and frequent intervals. On the other hand, if dipping fluids are allowed to rest undisturbed, they very soon are liable to undergo complete oxidation. But this does not teach us much as to the cause of the chemical change known as oxidation. It is not spontaneous, for it has been found that solutions of arsenic (arsenious oxide in alkali) can be kept at the laboratory for over a year without any material change in the direction indicated. It has been thought for some time that there must be some specific cause for this alteration of arsenite to arsenate, and it has been previously stated by others that micro-organisms play an important part in the process of oxidation, and conversely of reduction. that is, the reformation of arsenite. The results of the present experiments appear to suggest that micro-organisms may not be responsible for the entire change. If they were wholly responsible for the oxidation of arsenic, it would seem likely that strong disinfectants would completely arrest the action. The writer failed to accomplish this with formalin, corrosive sublimate, carbolic acid and boric acid, in strengths of 2.5 per cent., 5 per cent., 0.5 per cent. and 2 per cent. respectively. Oxidation, after two months' treatment, increased approximately 15 per cent. in each instance.

Other means were looked for to arrest the action of these micro-organisms, such as sterilisation in an autoclave, boiling for half an hour, and passing the original dipping fluid through a candle filter. If all the oxidation is due to micro-organisms or bacterial agency, the aforementioned treatments it was thought would prevent further action taking place. It was found that oxidation was not entirely arrested by these means, and 9 per cent., 3 per cent. and 6 per cent. respectively were added to the original 25 per cent. in three weeks. It is stated here, for comparison, that the oxidation of the untreated control sample reached 80 per cent. in the same period of time. This is an increase of 55 per cent. The actual figures of the experiment are given in Table I.

TABLE I.

Dip taken from Salisbury Tank.

At the time of starting the experiments the dip contained:—

Arsenious oxide ...	0.103 per cent.	= 25 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	

† This means total arsenic in terms of arsenious oxide.

The experiments were allowed to continue for twenty-one days, and then analysed, with the following results:—

Expt. 1.

Control (untreated).

Arsenious oxide ...	0.027 per cent.	= 80 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	(increase, 55 per cent.)

Expt. 2.

Sterilised in autoclave.

Arsenious oxide ...	0.090 per cent.	= 34 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	(increase, 9 per cent.)

Expt. 3.

Boiling for half hour, and making up loss with water.

Arsenious oxide ...	0.099 per cent.	= 28 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	(increase, 3 per cent.)

Expt. 4.

Made acid, and then again alkaline with sod. bicarb.

Arsenious oxide ...	0.042 per cent.	= 69 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	(increase, 44 per cent.)

Expt. 5.

Passing original dip through candle filter.

Arsenious oxide ...	0.095 per cent.	= 31 per cent. oxidation
†Total arsenious oxide...	0.138 per cent.	(increase, 6 per cent.)

At the time the above experiments were conducted, one gram of potassium cyanide was added to 500 c.c. (0.2 per cent.) of dip, and it was found that oxidation was arrested during the three weeks given for its test; *vide* Table II.

TABLE II.

Before commencing experiment, the dip analysed:—

Arsenious oxide	0.103 per cent.	= 25 per cent.
Arsenate, in terms of arsenious oxide	0.035 per cent.	oxidation

Effect of Cyanide during Three Weeks' Trial.

	Arsenious Oxide.	Arsenate in terms of Arsenious Oxide.	Oxidation, per cent.
Treated with cyanide (0.2 per cent. pot. cyanide)	0.103	0.035	25
Untreated	0.027	0.111	80

The arresting of the chemical change by so small an amount of potassium cyanide led the writer to conduct further work with varying but smaller quantities of cyanide, in order to ascertain to what extent the reduction in the amount to add was possible. These interesting and instructive results are given in Table III.

† This means total arsenic in terms of arsenious oxide.

TABLE III.

Addition of Cyanide.

Started 20th January, 1916.

Analysis of Dip before Treatment.	per cent.	Oxidation, per cent.
Arsenic, in terms of arsenious oxide	0.117	14
Total arsenic, in terms of arsenious oxide ...	0.136	

Control (untreated) 1st Feb., *i.e.*, after 11 days.

	Arsenious Oxide, per cent.	Oxidation, per cent.
Contained	0.003	97
Treated—		
No. 1 contained 0.1 per cent. pot. cyanide.		
1st Feb. contained	0.110	19
No. 2 contained 0.05 per cent. pot. cyanide.		
1st Feb. contained	0.110	19
22nd Feb. contained	0.099	27
No. 3 contained 0.01 per cent. pot. cyanide.		
1st Feb. contained	0.110	19
22nd Feb. contained	0.099	27
No. 4 contained 0.005 per cent. pot. cyanide.		
1st Feb. contained	0.110	19
22nd Feb. contained	0.099	27
No. 5 contained 0.001 per cent. pot. cyanide.		
1st Feb. contained	0.025	81
No. 6 contained 0.0005 per cent. pot. cyanide.		
1st Feb. contained	0.016	89
No. 7 contained 0.0001 per cent. pot. cyanide.		
1st Feb. contained	0.003	97

It is noticed that No. 7 corroborates the control sample (the untreated sample), and it means that when the amount of pot. cyanide is reduced to 0.0001 per cent., its influence to inhibit oxidation is not apparent.

These experiments shew that varying amounts of pot. cyanide, 0.1, 0.005, 0.001, 0.0005 and 0.0001, expressed as percentage, have been added to dip, and the samples allowed to rest eleven days.

The retarding influence on oxidation remains constant until 0.005 per cent. is reached; below this, oxidation increases as the amount of cyanide is decreased.

It is again noticed, as in the cases of the (1) autoclave, (2) boiling for half an hour and (3) candle filter, that cyanide does not completely arrest oxidation, for in the following three weeks another 8 per cent. is added. In one month after the addition of as little as 0.005 per cent. of pot. cyanide the oxidation has increased only 13 per cent., whereas the untreated dip shewed an increase of 83 per cent. of oxidation in 11 days.

Note.—The experiment shewing that 0.2 per cent. pot. cyanide completely arrests oxidation needs corroboration.

New Crops for Rhodesia.

Report on the Experimental Work conducted at the Agricultural Experiment Station, Salisbury, 1916-17.

(*Continued.*)

By J. A. T. Walters, B.A., Assistant Agriculturist.

The 1916-17 season opened extremely favourably, early and consistent rain being a feature of the weather throughout the greater part of the country. Unfortunately, this state of things only lasted until the first week of January, when a drought set in, continuing until March. This period is a critical one in the life of the maize crop, as the plant is then in flower and setting seed. Ample rain is perhaps more necessary at this time than at any other, and the result of such a drought usually is to retard the appearance of the silk. The tassel, however, will appear normally, and will shed its pollen before the silks have emerged to receive it. By the time the silks do appear, most of the pollen has already been shed, and as pollen is essential for the formation of grain the cob is imperfectly formed, a great number of the grains being wanting. This has been a widespread source of low yields during the last two seasons. Nor is the damage confined to maize. Such a drought is extremely detrimental to short season grain crops such as wheat, linseed, beans, cowpeas and buckwheat, which require a fairly consistent rainfall throughout their short period of growth.

In the light of our experience during the last few years, the conclusion has been forced upon us that the question of moisture is almost the most important of all in the growing of our crops. As the rainfall cannot be relied upon, the farmer has to devise means for safeguarding himself against possible droughts, and this, it would seem to us, can only be done by the practice of certain of the principles of *dryland farming*. Thus in the case of the small grain crops mentioned above, which are usually sown after the middle of December, the land for these should be ploughed as early as possible, and any early rains conserved in the soil by means of harrowing whenever possible after the rains. In this way only can success be hoped for in a climate where breaks in the weather are of such frequent occurrence. The maintenance of a surface mulch becomes a factor of primary importance. It is too often the case with crops like wheat and oats that the land is only prepared immediately before sowing.

EXPERIMENTS WITH MAIZE.—The seed used is the new strain of Salisbury White described in the *Rhodesia Agricultural Journal* for October, 1916. Grown in the ordinary way on unmanured land, which had been cropped for many years to various crops, the average yield was only 876 lbs. per acre.

A new method of growing maize was tried, in which the rows were planted alternately with legumes. The effect upon the yield was very marked, as the following figures shew:—

Maize alone	876	lbs. per acre
Maize alternately with cowpeas	1,160	,, ,,
Maize alternately with dhal	1,280	,, ,,
Maize alternately with peanuts	1,560	,, ,,

These figures only confirm somewhat similar results obtained in other countries. The practical difficulties of applying such a method are considerable, but it might be feasible on certain soils to plant two rows of maize alternately with two rows of peanuts, using both planters simultaneously.

Planting in hills, 3 feet apart each way, two plants in each hill, did not give as good a yield as our ordinary planting 3½ feet by 15 inches.

Cutting the tops of the maize plant above the cob for ensilage did not reduce the yield of grain. American experience has been that a small loss of grain results from this practice.

Maize for Ensilage.—The usual practice in this country is to sow maize late in the season for ensilage purposes. By sowing during the first half of January, the maize is usually ready to be cut in April. It has been observed, however, that maize sown at this period may suffer very heavily from borer attacks. Our experience for the last three seasons at the agricultural experiment station has been that the maize sown about the middle of January has been ruined from this cause, and rendered useless for ensilage. There is no reason why the silo pit should not be filled in March. Provided the pit is dug to begin with, the little rain that may fall during the making of the ensilage will not harm it in the least. Planting during the second half of December,

therefore, for the ensilage pit would seem to have much to recommend it.

The growing of velvet beans with maize for ensilage has proved uniformly successful, the maize providing a support for the climbing bean. The two crops should be planted either in the same row or as near as possible, leaving room between the rows for cultivation. The advantage of planting velvet beans about a fortnight before the maize has been remarked upon in previous reports.

Rotation Experiments.—In these experiments maize is used as an index of the effects of the following treatments:—Growing the same crop continuously; fallowing in alternate years; once in a three years' rotation unmanured; and once in a four years' rotation with roots manured. The results are sufficiently startling to warrant the close attention of farmers:—

	Yield in 1917.
1. Maize grown continuously for four years (unmanured)	550 lbs. per acre
2. Maize grown alternately with fallow ...	700 ,, ,,
3. Maize grown in rotation with wheat and velvet beans (unmanured)	1,200 ,, ,,
4. Maize grown in rotation with wheat, velvet beans and roots (manured)	1,680 ,, ,,

These trials are now in their fourth year, so that each rotation has been completed. It is, of course, not suggested that the same land should be used for maize once only in three or four years. The results, however, demonstrate how rapid a deterioration takes place on our ordinary soils when maize is grown continuously, and they shew, further, how possible it is to maintain fertility when rotation of some form is feasible.

Wheat.—*Summer Crop.*—Compared with the returns obtained from winter wheat under irrigation, the yield from the summer crop appears small. The principal factor affecting the yield is rust. Another factor which has greatly interfered with the returns during the last few years has been the irregular incidence of the rainfall. In good growing seasons, when the rains have been uniform, yields varying from 3 to 4 bags per acre have been obtained on unmanured land. A period of drought under ordinary circumstances will reduce this yield by one-half. The wheat trials this last season may be divided into those sown early, viz., before 1st January, and those sown from the 15th January onwards. In the first case, the average yields per acre amount to 312 lbs. of grain; in the latter case, to 100 lbs. per acre, a difference due probably entirely to weather conditions. The variety used is that known as Yellow Cross, which has proved itself more rust-resistant than any of the many others tried. It cannot be pretended that such returns are profitable, except at the present abnormal prices. However, much may be done, as indicated above, to overcome the risks attached to a droughty spell.

Oats.—Here again the effects of the drought are so marked that the trials may be divided into early and late sown plots. The principal variety used was Kherson's 60-day oat. When sown on the 15th December, a yield of 588 lbs. seed and 892 lbs. straw was obtained with-

out manure. The later sown plots averaged only 222 lbs. grain and 656 lbs. straw per acre. The better yield mentioned above is a payable quantity, and there is but little doubt that with attention to soil conditions far heavier yields may be obtained. As a rule the best period for sowing the oat crop is from the 1st to the 15th January. The other varieties—Smyrna, Burt, Sidonian, Texas and New Zealand oats—were sown at that period, with the result that very little growth had been made before the drought set in. For the same reasons the barley crop was a failure.

Oil Crops.—*Peanuts.*—Three years ago, in a good season, a return of 37 bags of Spanish peanuts was obtained per acre at the agricultural experiment station, a yield which does not equal the best recorded for this Territory. The importance of having as full a stand as possible cannot be over-emphasised with crops of this kind. It has been the writer's experience that stands of over 50 to 60 per cent. of plants in this country are rare. To obtain as perfect a stand as possible, the following experiment was tried this last season :—

1. Sowing single nuts at distances of 12 and 15 inches respectively.
2. Sowing two nuts together at the same distance.

In the former case, the poorest of the plots had a stand of only 60 to 70 per cent. When sown two in a hill, both stands shewed 97 per cent. of plants on a careful count. The yields of nuts obtained are in direct relation to the number of plants, viz. :—

Single nuts, 12 inches apart	780 lbs. per acre
Single nuts, 15 inches apart	800 ,, ,,
Two nuts, 12 inches apart	1,060 ,, ,,
Two nuts, 15 inches apart	1,056 ,, ,,

A gentleman representing an American firm of implement manufacturers, who was much impressed with the result, stated that there would be no difficulty in supplying implements capable of sowing two seeds together.

Other varieties of peanuts were grown for purposes of comparison, but none equalled the Spanish in yield. The next best, Virginia bunch, was also distinctly later in maturity.

Sunflowers.—The value of seed selection in this crop has not been frequently tried in this country. Seed selected for many years from the best heads were supplied for trial by a farmer, and although the yields are low, as might be expected, the effect of selection would seem to be apparent :—

Ordinary black seed	600 lbs. per acre
Selected black seed	724 ,, ,,

Castor Beans.—The yield from a second year plot, which had suffered somewhat from borer attacks, was surprisingly high, amounting to 698 lbs. of beans per acre. A first year's plot, planted 6 feet apart each way in December, 1916, yielded only at the rate of 289 lbs. per acre. A test made shewed that 100 lbs. unshelled beans yielded 57 lbs. clean beans.

Linseed.—This crop was practically destroyed by drought, after excellent germination and early growth.

Sesamum indicum.—The drought stunted the young plants, which were subsequently finished off by caterpillars. This indigenous crop has hitherto proved remarkably resistant to pests.

Niger Oil Seed (*Guizotia oleifera*).—This oil plant has become thoroughly acclimatised in this country, and after the first crop has been removed, it volunteers freely from seed. This last season it flourished in spite of the drought, and, in great contrast to the sesamum grown on an adjoining plot, did not suffer from any insect attacks. The harvesting of this crop is a difficult matter, but loss of grain may be largely avoided by pulling the plants before the heads are perfectly ripe, and allowing them to fill and dry out on a sail or clean floor.

Chili Oil Seed (*Madia sativa*).—This plant proved resistant to drought, and did comparatively well under trying circumstances. The seeds ripen rather unevenly, and some loss resulted from this circumstance.

OTHER CEREALS.—*Kaffir Corn.*—This cereal, when grown in small experimental plots, suffers so considerably from the attacks of birds that no reliable returns of grain are available. Best results were obtained by sowing thickly and thinning out to no more than 9 inches between the plants. This would seem to be rather close planting, but its main result was to prevent undue suckering, to which the plant is so prone, which interferes with the yield of grain.

Buckwheat.—The only variety tried was that known as Common or Japanese, and the experiments were devised to determine the latest date at which this crop can be sown, and the approximate date at which the heaviest yields are obtained. Previous experiments had shewn that about 30 lbs. seed should be sown per acre, and yields up to 10 bags per acre had been obtained at Salisbury in seasons of regular rainfall. A drought, however, seems fatal to this quickly maturing crop, and while the January sowings failed to yield one bag per acre, the February sowings gave just under two bags per acre, the plants reviving with the March rains.

Millets.—Both Boer manna and German millet, sown early in December, formed a fair crop, the former giving 2 bags seed to the acre and the latter just under a ton of hay. Sown early in January, only half the above yields were obtained. Boer manna, being a full season crop, needs to be sown early in any case.

LEGUMES.—*Dhal.*—Even perennial crops like dhal seem to have been affected by the drought. Better acre yields are obtained by planting dhal close in the rows than by giving each separate plant room to fill out completely. Sown 1 foot apart in the rows, a yield of 1,000 seed per acre was obtained. When sown 2 feet apart, the total acre yield only reached 650 lbs. The rows in each case were 3 feet apart. *Fifth year dhal.*—The original plot sown in 1912 has remained up to the present. Less than one-third of the plants are alive, but a yield of 350 lbs. of beans per acre was obtained. The plot will be allowed to stand, in order to see if any of the plants will succeed in surviving a sixth season.

Beans, Vetches, Peas, Egyptian Clover.—These legumes may be

considered as complete failures, due to the dry conditions obtaining practically right through the growing period. Peas, producing a yield of 1 bag per acre, gave better returns than beans. The growing of all short season crops will always be a matter of uncertainty, although much can be done to obviate this by thorough preparation of the land and constant harrowing if rains are unreliable.

Beggar Weed (*Desmodium tortuosum*).—This crop deserves attention as a leguminous hay crop. During this last season, in spite of the droughty conditions, a plot sown the previous season gave two cuttings of hay, amounting in all to 1,080 lbs. hay off ⅜ acre. Another plot gave at the rate of 1,750 lbs. per acre in a single cutting. This hay is comparable to peanut hay, and provides a valuable adjunct to the ordinary feeding stuffs of the farm. American analyses shew beggar weed to contain 11.8 per cent. nitrogen, as against 14.3 in lucerne and 7.4 in oat hay. Being a perennial, it requires less attention than other hays, and, being deep rooted and nodule-bearing, it undoubtedly acts as an excellent soil renovator. In view of the continuous satisfactory results from this crop, it can confidently be recommended for trial by farmers.

Hyacinth Bean (*Dolidros lablab*).—This crop made very satisfactory growth from our own seed this last season. It was introduced as a rival to velvet bean, as it has the additional advantages of being stingless and of producing a bean useful for human consumption. Both are equally sensitive to frost, and, being long season crops, are more likely to do well in the lower lying districts than in high and exposed parts of the country. This crop gives heavy yields of hay or green fodder for ensilage. No weights were taken this season, as all the seed was saved for further propagation.

Lucerne.—The trials conducted during the last few years shew fairly conclusively that a free subsoil is essential for the proper development of lucerne. The experiments with this plant include liming and fertilising the soil, sowing in different ways, and different varieties. In every case the plots were irrigated. The soil is fairly typical of most of our prevailing red soils, having a clayey subsoil at a depth of about 9 inches. This impervious subsoil, by preventing the development of the tap root, seems fatal to the continued healthy existence of the plant, which begins to die off from the second season onward. The number of varieties tried amount to twenty-one.

Other legumes tried include the following, which have shewn some promise of success:—*Sword bean* (*Canavalia gladiata*), the *Tepary bean* from the arid South-Western States of America, and *goat's rue* (*Galega officinalis*), which promises to be of value in pasture mixtures.

Root Crops.—Owing to the failure of our seed supplies to arrive in time, no mangels, beet or carrots were planted this last season. A germination test with old seeds only confirmed the well-known fact that mangel seeds rapidly lose their vitality. *Chicory* did well after a crop of potatoes manured the previous season, producing close upon 1½ tons of dried roots per acre. *Field radish* was a decided success, the plants filling out well, and eventually producing a prolific crop of seeds. No feeding tests have yet been made with this root, but extended trials, which are arranged with our own seed at the Gwebi farm, will enable

this to be done during the coming season. *Sweet potatoes* (*Batatas edulis*) continue to prove eminently satisfactory under unfavourable conditions in this Territory, and trials are being conducted with a number of early-maturing varieties. There seems to be very considerable looseness in the names given to the different varieties of sweet potatoes, so that it is difficult to obtain any particular variety with certainty.

Hay Crops.—Pure stands gave the following yields, seed being sown at the rate of 8 to 10 lbs. per acre:—

Teff grass	1,380	lbs. per acre
Boer manna	1,484	,, ,,
German millet	1,516	,, ,,
Sudan grass (2 cuttings)	3,620	,, ,,

The following attempts at the production of a mixture for hay purposes, which should both increase the yield and provide a better ration, deserve note. Two cuttings were obtained in each case:—

Teff, millet and beggar weed (12 lbs. per acre)	3,592	lbs. per acre
Teff, oats and maple peas (20 lbs. per acre)	3,428	,, ,,
Teff, Sudan grass, millet and manna (12 lbs. per acre)	2,792	,, ,,
Sudan grass and peas (12 lbs. per acre)	3,680	,, ,,

The increase in yield is very marked, except in the case of Sudan grass, and here the admixture of peas was not a success, as they germinated slowly, and were suffocated before reaching maturity.

Nature Notes.

VII. BIRD LIFE ON AN UMTALI FARM.

By Lionel Cripps, M.L.C.

I do not know whether the eastern border of Rhodesia has been picked out by birds as home in any greater degree than other parts, but it is a matter of note that they are here in great numbers and variety, and live on mountain, hill and valley, in forest and bush, where many differences in temperature are to be found. Some kinds live only on the high mountains and forest regions, and are never seen in the

lower lying parts, while others keep to the bushed valleys, and it is worthy of note how local many birds are in their habits of life, refusing to leave their regular beats for more distant and greener fields—except, of course, during periods of migration.

The birds of prey are well represented here, and we have had visits from the black, red-necked, king vulture and its Egyptian brother, a much homelier and more unwashed looking ruffian; also from a diminutive variety, unknown to me by name. These birds were common at one time, but are rarely seen nowadays, and I have to think back to a time, some years ago, when I saw the last specimens. Maybe they have better feeding to tempt them up north, or the droughts in the south and west have enabled them to feed full and frequently. I can well remember them during rinderpest times, when they came in their hundreds to enjoy a time of feasting. The secretary birds are not often seen here; but live on the open ground of the mountain tops, where they also breed, using the same nest, made in a tree, year after year. The chanting goshawk, a handsome slate-coloured bird, with red legs, is both a high and low velder, and a mighty slayer of serpents, a St. George among his fellows, and worthy of all encouragement. A fight between him and a puff adder is worth watching. Never would I lift the hand of violence against him.

The eagles are well to the fore, and "lammer fangers" have been known to stoop, even on the very homestead, at the white, and therefore irresistible, Leghorn fowls; but, as a rule, prefer to go further afield for their killing. Then there are the Bateleur eagles, the "jakal's vogels" of the Africander, birds of omen to the native, who will not go forward on a journey should the shadow of one fall athwart his path on his setting forth. So far as my experience goes, it is not a slayer of the farmer's fleecy or other flocks, but a scavenger, and possibly ready to give the finish to the wounded and ailing among wild animals. They are the sanitary inspectors of the veld, and are not feared by the poultry, which have got used to seeing them as they fare along on their beat. The Godzi eagle of the natives, black, with white breast, is a grand bird, and a great snake killer. Then there are the fishing and crested eagles, both rarer.

The deadliest of the birds of prey, so far as poultry is concerned, is the brown hawk, a harrier I should think, a low-flying skulker amongst the tree tops; but the common lanner runs him close, and takes second place as a killer of chickens, which he will lift from under one's very nose, and yet escape by reason of his swiftness, although one is armed to the teeth for the defence of property. I have never seen these hawks in the mountains, where they would come into violent contact with the little brown sparrow hawks, which do the policing of the high veld, pure mountaineers, scorning to descend to the valleys. The lanners are migratory, like most other birds, and I have counted 600 of them in a flight, going eastward. These birds will rarely tackle a quarter-grown chicken; but I have seen one catch a full-grown redwing partridge, which had dropped to earth like a stone and escaped on the first stoop of his enemy. There is a pigmy hawk too, surely the smallest of his kind, with black bands on his chest, otherwise of a slate colour.

The locust hawk is much like a kite, but has not a forked tail. He follows the locust flights and lives on these pests exclusively, when on their trail. I have seen two hundred together. On one occasion I shot one, thinking he must be gorged with locusts, which were in millions all around; but found only one in his stomach. Enough with him was evidently as good as a feast. The kite, which daringly and lazily flops around, looking for a bone or other dainty, can rouse himself to some purpose when a pheasant heaves in sight, and I saw one escape, as it were, by the skin of its beak, from a stoop that would have done credit to any of the birds of prey. There are several varieties of high veld hawks, which are dwellers in the forests, and only come out in order to pass from one patch of forest to another, when they fly very low, as if to avoid observation. There are several species of owls, feared by the Mashonas, and, under certain circumstances, able to foretell death in the family.

One can always give a welcome to the cuckoo family, which contains some beautiful individuals, notably the slate and the green with white spots; also the handsomest and largest of its kind—to wit, the vlei lowrie of the South African born, which loves reedy river beds, and has such rich, deep notes, a weak flier withal, and very shy, possibly in consequence of that fact. The ubiquitous honey guide is in evidence to shew that birds of the highest order of intelligence do exist here. Hs is also here to point out that good brains may go well with a plain exterior, and to hint that it is not always safe to judge individuals by their clothes only. I have never known of a case of a little guide pointing out a lion or a snake—he is a honey guide, purely and simply, and not a jack of all trades, with the consequence of being master of none.

The coly or mouse bird is here in two varieties: one drab, as to both bill and feathers, but exceedingly bright-eyed and voluble, not given to long flights; the other, with red bill and legs to relieve the monotony of his colour scheme, described by a neighbour of mine who was fond of a dainty morsel at times as being a ball of fat. The ever alert green red-headed woodpecker helps to liven up the country side, a beautiful and most interesting bird, much like, at first glance, the kingfisher tribe, which in black and white and in the shape of the tiny bird of blue and red flash along the streams, a joy to the eye; the latter variety nesting in holes of goodly depth, burrowed into the river bank, which are not to be too closely pried into because of the unsavoury scent issuing therefrom. Akin to the foregoing is the land kingfisher, which has gone dry and refuses to take his food from the liquid element. He has an interesting habit of singing duets with his mate, and, presumably as a help to enable him to take his high notes, raises himself on his toes and lifts his wings overhead at the same time. I know an orator who also raises himself on his toes when he wishes to emphasise a point, but, having no wings to raise, he puts his hands in his pockets instead. It is, apparently, a mistake to adopt a cramped attitude if one wants to be effective.

The mighty roaring-bird or giant ground hornbill nests here in hollows of trees and uses the same nest for several years; a glutton when locusts are in season, and also, unfortunately, a stealer of monkey

nuts at times; but surely forgivable even then, as there are none too many of his breed. The forest hornbill, white and a little black too, runs him close as to size, and has the knack of bleating like a sheep; found in large flights at certain seasons, when the fruit of his choice is ripe. Then there are the black variety with red beak, and the grey, which builds in tree hollows; but not here so far as I am aware. The female is "daggaed" up by the male bird and fed through a small hole left in the mud during the sitting time. It is evident that she is of a flighty nature, not to be trusted abroad, and given to racketing. One wonders when and how such an arrangement came into vogue. The agreement between both parties must be complete, as the mud wall could easily be shattered by a blow from the female beak.

All these birds are worth looking at and admirable in their way, until seen alongside what must be reckoned the glory of the countryside, namely, the two varieties of lourie or taraco, *alias* plantain eater, *alias* huru-kuru, in two schemes of colour; the low velder in dark blue and green and scarlet, and the high velder in bright green and scarlet, and each kind reigning supreme as to beauty in his own sphere, and never, by any chance, trespassing on the other's preserves. The blue variety is rarely seen, except singly or in pairs, and then along the courses of the streams, whereas the green can be seen in troops of twenty in the mountain forests. Each variety has its own notes. Both blue and green are poor fliers, and keep low when passing over open country. The nests of the green variety are roughly made of twigs, and are much like the ordinary doves' nests. The poor relation exists in the shape of the "kwaa" bird; not in the least "umble," as would be fitting to such a poorly dressed creature, but, on the contrary, mocking and abusive to a degree. A yearly visitor, not given to outstaying his welcome. There can be no question about the hoopoo being a neat, distinguished looking bird, always calling for notice, and a great eater of insects.

The family of bee-eaters are all fit subjects for our respect, and range in size from the big fellow with a plum-coloured breast, which can handle a migratory locust and dispose of it while in flight, to the next in size, the "mountain swallow," green and yellow, to his yet smaller brother, the glossy black, with the forked tail, a lover of grass fires, a catcher of bees, if ever there was one; then last and least, the tiny gold and green morsel, that makes its nest in a hole burrowed into the side of an open trench or bank. The rollers, locally termed "blue jays," of both varieties look much alike until seen at close quarters, when one will be seen to sport a couple of long tail feathers, apparently to distinguish him from the baser born that have no such ornaments. The same remark might apply in the case of the pennant winged night jar, which has such remarkable wing feathers during the pairing season, and so cannot be mistaken for its unadorned relation. The "churning" of night jars is one of *the* sounds of the country, and the note is so prolonged as to make one wonder when the singer is going to take breath. It is at times mistaken for the sound made by a certain kind of frog. Swallows and swifts, of a colossal energy, are here, of course, and are respected even by the small boy and the native.

The birds I regard with aversion are the white-backed carrion crows, which are here in great numbers, often passing in flights of many hundreds on their way to roost for the night on some favoured cliff-side. I knew an Australian who shot these when chance offered, as he said that in his country they were noted for pecking the eyes out of men lost and dying in the bush! The white-throated and black crows are not often seen off the high veld. The latter variety cultivates the art of warbling, and puts up quite a respectable performance. I have only noticed one kind of oriole, golden as to body, with a black head and red beak, and a very rich attractive voice. The shrikes are in plenty, and include the yellow-green variety that sings duets, the "bok-ma-keerie" or "kokovik" of the Cape, and the "gurra-gurra"; also, I think, the so-called "twelve apostles," in black and white, and, I presume, also the "butcher-bird," a most useful little customer, with an eye to his future needs and a friend of man. The paradise fly-catcher builds here, and has a most exquisitely made nest, which it hangs at a bough end.

Two kinds of thrushes can be seen at times; also the bul-bul, which can be reckoned the greatest of orchard robbers, and is, therefore, fair game for the small boys' catapults—a good singer nevertheless. The sunbirds are here in at least four varieties, and should be catered for by those who can appreciate their exquisite colours. They have a special liking for golden shower flowers, which they pierce from the side and so take a short cut to the nectar. They will spend half their lives and build in tecoma bushes, which are in flower nearly all the year round. One lady I know keeps them in captivity, and has a special skill in feeding them so that they live for years under her care. The wagtails are here, as indeed they appear to be wherever I have lived, and can be reckoned ubiquitous. A farm without starlings would be a poor place of residence, and I am pleased to be able to record the existence here of no less than three varieties, all beautiful, viz., the red wing, the glossy green, and the purple and white. The first named is a high velder, and the second and third low country birds. The red wing is very fond of the scarlet flowers of the kaffir boom, which is ablaze with colour long before the leaves come out in the early spring. I had nearly forgotten to mention the wattled starling, or little tick-bird, which is no wonder, as I have not seen a single specimen of this most cute little fellow for many years; in fact, since dipping of cattle came into fashion. I can therefore presume that ticks-cum-arsenic are not good for little birds' digestions. He is a most decided loss to the community. Two kinds of larks, including the orange-throated, honour us with their presence.

The columbidæ form a family of respectable size in these parts, and in the low veld are seen in the shape of turtle doves, the lesser and the greater, and, as regards the former, in great numbers; also in the forms of the green or fruit pigeon, the little dove with the green feather on the wing, and the namaqua. The high veld is also rich in the possession of the bush-pigeon, with yellow legs and white spots on a brown and purple body colour; the blue-rock, with red legs and eyes, the little dusky forest dove, and a whitish variety, which is so

rarely seen that it may be an albino only. The bush-pigeons come in flights of a hundred head, while the blue-rocks are few in number here, but are common up Inyanga way.

The finches are found in great numbers and variety, including two "barbets," the widow birds, the black and scarlet and the yellow and black, the ordinary kaffir finch, with the hanging nest, entered from the lower side and hung from a bough or reed end, often over the water. These birds often clear the leaves off the bough on which their nests are hung, probably as a protection against snakes. Then we have swarms of the tiny black, red and blue waxbills, so beloved by bird fanciers in Europe and the small boys with trap cages out here. The Cape canary favours the high veld in its more sheltered aspect and sings as sweetly as elsewhere. The chat family is well represented, and is headed by the little robin, which is a beautiful songster, and can be heard in the spring, especially along river beds. There are buntings in goodly numbers, as well as many birds not mentioned by me. It would not be well, however, to pass on without mentioning the grass bird, a tiny little brown creature, but the hero of the Zulu legend which dubs him "the king of birds," as he outwitted the holder of that title by concealing himself in the feathers of the lordly eagle that held the record for soaring to a height on which depended the very existence of his kingship. It was at a re-trial of the powers of all the birds that the eagle proved himself the legitimate holder of the title, until, when he had soared almost clean out of sight and had got to the end of his tether, the little grass bird flew out of his feathers, and, fresh and strong, soared up higher. It was thus that he earned his proud title of "king of the birds."

The parrots come here in goodly numbers and in two varieties, both green and yellow as to colour, but of two sizes and a great loquacity. They seldom stop screaming when in flight, and being birds of mark, both by reason of their colour and their noisiness, are very shy and difficult to approach. The fruit of the m'shagata tree, the "grey apple" of the South Africans, is their most favourite fruit, in that it has a fine flavoured kernel inside the stone, which can be picked out of two openings where the resisting power, to a deft beak, is not too great.

Of game birds we have what may be termed the usual assortment, which are aptly headed by the handsomest and most prominent, none other than the guinea fowl, which is common here and in hundreds, having readily responded to kind treatment. At one time they came near to extermination, and could muster, all told, over a big area, only six individuals. Over that same acreage they can now be seen in troops up to one hundred strong. Their favoured food is nut grass, which was growing thickly in parts of the cultivated ground, but is now much reduced. They can, therefore, be readily recommended to farmers as good birds to preserve, especially as, so far as my records go, they never do any harm to the growing mealies, and I have a shrewd idea that they can do good work in an orange grove infested with codlin moth. A farmer who shoots these birds is blind to his own interests. There are three varieties of francolins, all eaters of ticks and other noxious insects, viz., the pheasant, the redwing and the bush partridge,

and three kinds of quail, which, according to FitzSimons, are perfect gluttons where ticks are concerned. The ordinary brown quail appears in fairly large numbers on the high veld during its migration.

Of one kind of bird we are woefully short. I refer to the waders; but even they are here in small numbers and come yearly, namely, the two rails, coots, snipes, sandpipers and two sorts of plovers, including the spurwing. We could well do with many more. Of bustards there are the bush korhaan, the dikkop or "stone plover," and a near neighbour, in the shape of the paauw or great bustard, which keeps chiefly to the high veld to the north. The same can be said of the crowned and kaffir cranes; but of their near relatives, the herons, we have the grey, the brown and the snowy white egret; also the splendid stork or locust bird, which visits here in hundreds when on trek, and consumes huge numbers of ground crickets. It would be interesting to know how long these birds take to do the round trip from Europe to South Africa and back again. Of waterfowl we have practically none, with the exception of an odd duck or two, black with white wing feathers.

It is good to be alive in a country rich in birds, and any measure projected in the future for their preservation will surely have our intelligent sympathy and support if we educate ourselves up to becoming observers of bird life on our Rhodesian farms.

Reports on Oil Seed

BY THE IMPERIAL INSTITUTE.

The following reports, dated 27th August, 1917, on samples of oil seeds have been received from the Director of the Imperial Institute, South Kensington. They relate to samples grown in Northern Rhodesia, but are largely applicable to the same crops in the Southern territory.

Our experience of the black and grey striped Russian sunflower is identical with that indicated in these reports. Sesame is successfully grown at the agricultural laboratories, Salisbury, every year, but harvesting difficulties have so far prevented it being widely taken up. The Zanzibar variety of castor oil has not done satisfactorily in Southern Rhodesia, much of the seed being empty or dry inside, and other varieties, although of good quality, have not yielded sufficient return per acre to be largely grown by farmers. Linseed, though yielding light

crops, serves such useful purposes as to be pretty generally grown, though only for local consumption. The samples were forwarded by the British South Africa Company in February, 1917. The oils were not chemically examined.

CASTOR SEED.

Imperial Institute No. 976/1917-1.—*Ricinus sanguineus Zanzibaris*, red Zanzibar castor bean; weight 1½ lb. Clean, reddish-brown castor seeds, of moderate and uniform size. The average weight of a single seed was 0.5 gram.

Yield of Oil.—48.4 per cent. from the seeds containing 5.2 per cent. of moisture, equivalent to a yield of 51.1 per cent. from the dry seeds. The oil had the usual consistency and appearance of castor oil; acid value, 1.2. The oil was not submitted to chemical examination.

Commercial Value.—These castor seeds contain a normal amount of oil, and were in good condition. The maximum controlled price of castor seed in the United Kingdom is now £37 per ton (August, 1917), but in normal times the value is about £11 per ton.

BLACK SUNFLOWER SEED.

Imperial Institute No. 976/1917-2.—*Helianthus annuus*, black sunflower; weight 1¼ lb. Fairly large black seeds of uniform size, clean and practically free from immature seeds. The seeds consist of kernel 56 per cent. and husk 44 per cent.

Yield of Oil.—25.5 per cent. from the whole seed containing 7.4 per cent. of moisture, equivalent to 27.5 per cent. from the dry whole seed, or 49.1 per cent. from the dry kernels. A pale yellow liquid oil; acid value, 4.3.

Commercial Value.—These seeds contain a satisfactory percentage of oil, and were in good condition. This black variety of sunflower seed is evidently superior to the "striped Russian" seed (see below). Sunflower seed is not quoted in the market reports at the present time, but the Imperial Institute was recently informed by brokers that Rhodesian sunflower seed equal in quality to previous consignments from that country would be worth about £20 per ton in London (May, 1917).

STRIPED RUSSIAN SUNFLOWER.

Imperial Institute No. 976/1917-3.—*Helianthus annuus*, striped Russian sunflower; weight ¾ lb. Large bold seeds, of cream colour, with dark brown, longitudinal stripes. Only about a quarter of the seeds contain kernels, the majority of the seeds being immature. The mature seeds selected for analysis consisted of kernels 45 per cent. and husks 55 per cent.

Yield of Oil from Mature Seeds.—20.7 per cent. from the whole seed containing 5.1 per cent. of moisture, equivalent to 21.8 per cent. from the dry whole seed or 48.8 per cent. from the dry kernels. A pale yellow liquid oil; acid value, 2.4.

Commercial Valuation.—Sunflower seed represented by this sample would be of no value as a source of oil, owing to the presence of a large proportion of immature seeds devoid of kernels. The mature seeds, moreover, give a low yield of oil, owing to the large proportion of husk, and this variety is, therefore, not to be recommended for cultivation as an oil seed in Rhodesia.

SESAME SEED.

Imperial Institute No. 976/1917-4.—*Sesamum indicum*, sesame; weight $1\frac{3}{4}$ lb. Very small pale brown sesame seeds, in clean condition.

Yield of Oil.—50.4 per cent. from seeds containing 4.9 per cent. of moisture, equivalent to a yield of 53.1 per cent. from the dry seeds. A light brownish-yellow liquid oil; acid value, 4.5

Commercial Valuation.—These sesame seeds contain a normal quantity of oil, and were in good condition. The maximum controlled price of sesame seed in the United Kingdom is now £32 per ton (August, 1917), and there should be no difficulty in disposing of consignments in this country.

WHITE FLOWERING LINSEED.

Imperial Institute No. 976/1917-5.—*Linum usitatissimum*, white flowering linseed; weight $2\frac{1}{4}$ lbs. Fairly clean, small linseed, a fair proportion of immature and unripe seed being present.

Yield of Oil.—32.5 per cent. from seeds containing 6.3 per cent. of moisture, equivalent to a yield of 34.7 per cent. from the dry seeds. A yellowish-brown liquid oil; acid value, 2.6.

PSKOFF LINSEED.

Imperial Institute No. 976/1917-6.—*Linum usitatissimum*, pskoff linseed; weight 2 lbs. This seed was rather smaller and of lighter colour than the white flowering linseed No. 5. The sample contained a fair proportion of earth and dirt, but a smaller quantity of immature and unripe seed than sample No. 5.

Yield of Oil from Seed freed from Earth by Sifting.—33.7 per cent. from seeds containing 6.3 per cent. of moisture, equivalent to a yield of 35.9 per cent. from the dry seeds. A yellowish-brown liquid oil; acid value, 2.1.

Commercial Valuation.—The samples of pskoff and white flowering linseed consist of small seeds of rather poor appearance. The yield of oil was, however, in each case within the usual limits (32 to 43 per cent.) for commercial linseed. The maximum controlled price of linseed in the United Kingdom is at present £30 per ton (August, 1917). In June, 1914, Calcutta seed was selling at about 50s. per quarter of 410 lbs. in London, and La Plata linseed at about 54s. per quarter of 416 lbs. in Hull.

Imperial Institute of the United Kingdom, the Colonies and India.

COMMITTEE FOR THE UNION OF SOUTH AFRICA AND RHODESIA.

The Executive Council of the Imperial Institute desires to bring to notice the operations of the Imperial Institute, especially as regards the facilities it now possesses for affording information respecting raw materials and their value for commercial purposes

A Committee has now been formed for each Dominion. The Committee for South Africa was appointed in November of last year, and on the Committee's recommendation the Executive Council has recently sanctioned the addition of two members representative of Rhodesia, in order that subjects of general interest to South Africa may be discussed in common. The Committee includes the Right Honourable W. P. Schreiner, C.M.G., High Commissioner for the Union of South Africa (Chairman); Dr. Horace T. Brown, F.R.S.; Mr. C. du P. Chiappini, Trades Commissioner in London for the Union of South Africa; Mr. F. Dyer, of Messrs. Dyer & Dyer, Ltd.; Mr. D. O. Malcolm, Director of the British South Africa Company; Mr. C. W. S. Maude, British South Africa Company; and Mr. W. Soper, of Messrs. Davis & Soper. Lord Islington, Chairman of the Executive Council, and Professor Wyndham R. Dunstan, Director of the Imperial Institute, are *ex officio* members of the Committee. This Committee meets periodically to receive reports and make suggestions regarding the work of the Imperial Institute for South Africa.

The principal objects of the Imperial Institute are (1) to assist producers overseas to find appropriate openings for raw materials and primary manufactures, and (2) to furnish manufacturers throughout the Empire with information as to the sources of supply within the Empire of raw materials which they need.

The Institute in its several departments possesses an expert staff with special knowledge of the various raw materials and their industrial and commercial uses. The staff attached to the information department deals with the collection and supply of information respecting the sources and modes of utilisation of raw materials, prepares statements for distribution and publication, and answers all enquiries received at the Institute from this country and from the Dominions, Colonies and India. The staff attached to the laboratories is engaged in investigating the composition and value for commmercial purposes of raw materials. The whole of this work is carried on in communication with manufacturers and Chambers of Commerce, and with the advice of technical committees, which include well-known technical and commercial experts.

A special staff is devoted to mineral work, which is carried on with the advice of a committee on mineral resources, on which, besides specialists, the Home Government departments concerned are represented. It is believed that this useful work will be valuable in aiding the Imperial Mineral Resources Bureau, if established in accordance with the resolution of the Imperial War Conference.

A valuable adjunct to the Institute's work is provided by the exhibition galleries, in which are included exhibits of the pastoral, agricultural, forest and mineral resources of South Africa, including the exhibits of Rhodesia separately shewn.

In order to illustrate the kind of assistance which the Institute can render, a few recent examples of its numerous operations for South Africa may be quoted.

TIMBERS.—Of the South African timbers recently dealt with by the Imperial Institute, boxwood is specially important. South African boxwood (*Buxus Macowani*) was shipped to this country some years ago, but quickly fell into disuse owing to its tendency to "check," *i.e.*, to develop small cracks after being worked. A number of logs of the wood were sent to the Imperial Institute in 1913, when the trade had almost ceased. These were examined, and the working qualities of the wood were carefully determined.

The results were published in the Bulletin of the Imperial Institute, and a trial consignment of the wood requested for sale. This consignment was carefully prepared by the forest department, and on its arrival in London was sold at a satisfactory price. It was ascertained that the buyers found the wood quite suitable. Further shipments were recommended, and these on arrival in London were also sold at satisfactory prices. This led to a revival in the trade, and to a great increase in shipments by private firms, and there is now every prospect of a steady increase in the demand for South African boxwood.

PAPER-MAKING MATERIALS.—It is well known that the bulk of the world's supply of paper is made from spruce and other soft woods, the supplies of which are steadily diminishing. The quantities of soft woods available within the Empire are comparatively small, and so it has come about that the Empire is largely dependent on foreign countries, especially Scandinavia, for its supplies of paper, or the wood pulp from which it is made, the chief sources of supply within the Empire being Newfoundland and Canada. The Imperial Institute has, therefore, given special attention to the possible substitutes for wood, which are to be found in the grasses growing in tropical and subtropical countries. Among these is the tambookie grass of South Africa. This, on examination at the Imperial Institute, was found to give a yield of about 33 per cent. of paper of excellent quality, and the prospects of a paper industry in South Africa based on this material are now being carefully considered.

Tambookie grass is by no means the only paper-making material obtainable in South Africa, and from the information available at the Imperial Institute, it seems likely that the range of materials available will enable several classes of paper to be made.

CASSAVA STARCH.—In the past much of the starch used for industrial purposes in this country has been imported from Germany and Holland. Considerable interest therefore attaches to the possibility of increasing supplies of such starch from British territories overseas, and one of the most promising sources of supply is cassava, which is widely grown in British tropical colonies. A sample of cassava starch recently received at the Imperial Institute from Rhodesia was found on examination to represent a fairly good quality of starch, which should find a ready market in the United Kingdom if offered in commercial quantities. Estimates and information regarding suitable plant for the preparation of the starch were also furnished by the Imperial Institute to Rhodesia.

MINERALS.—A large number of minerals from South Africa and Rhodesia have been examined and valued, including the ornamental green stone known as verdite, natural ochres, magnesite (now of great importance as a refractory in the manufacture of steel), beryl, mica, shale, coal, limestone, radio-active uranium minerals, tantalum ores, asbestos and corundum. Samples of Transvaal corundum having been received and found to be of promising quality, the shipment of a trial consignment was suggested by the Imperial Institute. This, on arrival in the United Kingdom, was sold in consultation with the Imperial Institute at a good price, and there is now a prospect of a good market being found for the corundum in this country. Before the war this corundum was in no demand here, and therefore was exported to Germany.

There has been since the war a great scarcity of potash in this country owing to the fact that we have hitherto been dependent on Germany for the raw material. Materials representing possible commercial sources of potash from South Africa and Rhodesia are under consideration.

Among other subjects which are receiving attention from the Union and Rhodesia are natural dyestuffs, sugar cane, wax, sisal hemp and other textile fibres, various paper-making materials and oil seeds.

The few examples quoted in detail will make it clear that the Imperial Institute is now in a position to act as an important central agency for the promotion of inter-Imperial commerce and trade.

The Executive Council would point out that the Imperial Institute is not only concerned with scientific research, but is equipped for investigating and supplying information respecting technical and commercial matters.

The *Bulletin of the Imperial Institute* is the principal medium for the publication of information collected and of the results of the enquiries conducted. Other special publications are issued from time to time.

It will be seen that the sphere of the Imperial Institute is now clearly defined, and the Executive Council desires that the work should supplement and not overlap with that of other organisations, either for scientific research or for other purposes, whether established in this country or in South Africa, and that cordial co-operation with such agencies should be arranged.

The Committee for South Africa has already held several meetings, and is actively at work. Special attention is being given by the Committee to the extension and improvement of the South African section of the exhibition galleries. Here there should be an up-to-date representation of the pastoral, agricultural, forest and mineral resources of the Union of South Africa as well as of Rhodesia. Owing to lack of funds, the existing exhibits are in some respects not up-to-date, and many additions are necessary. The Committee is preparing a full report as to the further exhibits required from South Africa.

So far as Government enquiries from South Africa are concerned, the Institute is in communication with departments of the Union Government through the High Commissioner, and also with the British South Africa Company. Suggestions and requests for information are now invited from organisations in South Africa which are in any way concerned with the operations briefly described in this letter.

Enquiries will be welcomed about South African raw materials and primary manufactures, and as to the provision of possible markets for such articles in the United Kingdom and in the other parts of the Empire.

Enquiries from South Africa for raw materials, etc., from other countries are cordially invited, and every endeavour will be made in all cases of the kind to bring producers and users into communication with each other.

At the same time, it should be emphasised that the Institute is in a position to supply technical reports as to the value of raw materials, etc., submitted for investigation, and to give information as to the best means of exploiting these when they are found to be of commercial value and likely to be useful in the development of the industries and commerce of the Empire.

Broom Corn.

By J. A. T. Walters, B.A., Assistant Agriculturist.

As a result of the high prices now being offered in the Union for broom corn, and the satisfaction that Rhodesian samples have given, a keen interest is being shewn in the cultivation of this crop in this

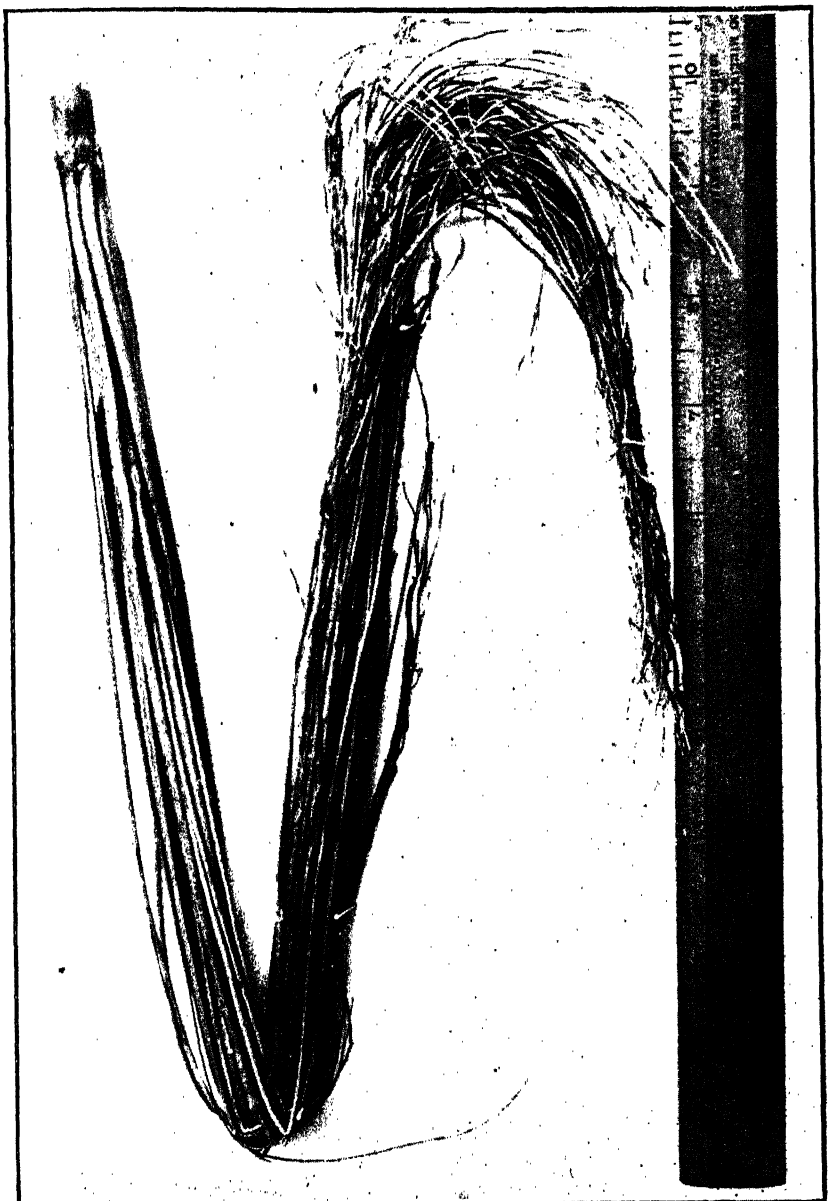
Territory, and many farmers are giving it a trial for the first time this season.

Broom corn is closely allied to kaffir corn, which it resembles very strongly. The distinctive feature of broom corn is that the seeds are borne on long branches, the branches and seeds being called the "brush." These branches are more or less straight, exceedingly tough, and, when stripped of their seeds, form an ideal article for the manufacture of brooms and brushes. The brush is harvested before the seed is quite ripe and while it is still of a green colour. If allowed to remain until the seed is perfectly ripe, the brush becomes discoloured, and commands a poorer price. It is usual, therefore, to allow a small patch to ripen for seed, and to use it for that purpose only. As colour is a factor of considerable importance, the heads should be harvested during a period of dry weather. For this reason, broom corn should be planted not earlier than the second half of December. Soil that will grow maize is well adapted to this crop, and from four to six pounds of seed will suffice to plant an acre in rows 3½ feet apart, with 9 inches between the plants in the row. It is best to sow thickly and to thin out to the proper distances, in order to avoid gaps, which cause the heads to become unduly coarse. The ordinary cultivation for maize is all that the plant requires.

The method of harvesting varies with the variety. The dwarf variety, which only grows about 4 to 5 feet high, is harvested by pulling the heads, and the yield is about 400 lbs. of brush per acre. The tall, or standard, variety is first bent over and later cut with a knife about 6 inches below the attachment of the fibres. The yield of this variety is about 600 lbs. of brush per acre. The operation of removing the seeds is a tedious one, but many home devices are in use to lighten the labour. On a large scale, thrashing machines for this purpose are available, costing £30 to £40 in the United States.

The brush is always graded before being marketed. The best brush is that with a good length of fibre of a fresh green colour, and as straight as possible. Crooked or discoloured fibre should be packed separately. The colour can be retained by drying as rapidly as possible in the shade, and straight fibres can be secured by harvesting at the right time, before the seeds become heavy enough to bend their stems.

After grading, the brush is baled in such a way that the butt ends are outside and the fibrous brush inside, the bales being made of a convenient size for transport. In America, bales are usually of 300 to 400 lbs. weight, but the only rule that applies is to make them of a size that will carry the fibre most conveniently and with least danger of damage.



Broom Corn Head. Minimum size required by Capetown market.

Maize Foods for the Home.

(*Continued.*)

JOHNNY CAKES, ETC. (*Continued*).

BANNOCK.

INGREDIENTS.

2½ *Cups boiling water.*
⅔ *Cup coarse maize meal.*
½ *Teaspoonful salt.*
1 *Tablespoonful butter.*

Put the boiling water into a saucepan, add salt and butter, and stir the meal in slowly. Continue stirring and boiling until the mixture is smooth, thick and stiff. It will probably require 15 minutes. Have ready on the stove some buttered tin sheets, very hot. Take a spoonful of the batter at a time and drop little rounds on the tins. Let them cook on top of stove for a few minutes, then bake in the oven for about a quarter of an hour.

MAIZE BREAD (1). ALSO CALLED JOHNNY CAKE.

INGREDIENTS.

3 *Cups maize meal (sifted).*
1 *Cup white flour.*
3 *Cups sour milk.*
1 *Egg.*
½ *Teaspoonful salt.*
1 *Tablespoonful molasses (syrup) or sugar.*
1 *Teaspoonful soda (large).*
2 *Tablespoonfuls dripping or butter.*

Mix all together except the flour and soda, sift soda with flour into the other ingredients. Bake in a hot oven for 30 to 40 minutes in a well-greased tin. This quantity makes a large and a small loaf.

MAIZE BREAD (2).

INGREDIENTS.

1 *Cup sour milk.*
1 *Cup maize meal.*

1 *Teaspoonful salt.*
½ *Teaspoonful bicarbonate of soda.*
1 *Cup white flour.*
2 *Eggs.*
1 *Tablespoonful (large) sugar.*
1 *Tablespoonful (large) dripping or melted butter.*

Mix the meal and sour milk overnight, add the other ingredients in the morning, and the soda dissolved in a little water, the last thing. Pour to thickness of one inch into shallow buttered pans and bake.

MAIZE BREAD (3).

INGREDIENTS.

2 *Cups maize meal.*
1 *Cup flour.*
1 *Teaspoonful cream of tartar.*
½ *Teaspoon bicarbonate of soda.*
1 *Cup sweet milk.*
½ *Cup sugar (small).*
2 *Eggs.*

Take maize meal and pour on enough boiling water to wet it all; cover and let stand till morning; then add flour and cream of tartar sifted together, dissolve bicarbonate of soda in milk, and stir with meal and flour; add sugar, and, lastly, put in eggs well beaten (yolks and whites separately). Bake in quick oven.

COUNTRY MAIZE BREAD.

INGREDIENTS.

1 *Cupful (small) maize meal.*
⅓ *Cup sugar.*
½ *Teaspoon salt.*
½ *Teaspoon bicarbonate of soda.*
1 *Egg.*
1 *Cupful thick sour cream.*

Sift together maize meal, sugar, salt, and add soda dissolved in a little warm water. Beat egg, add to it cream, and stir into the dry ingredients. Bake in a shallow buttered pan for 25 minutes. Cut into squares and serve.

OHIO MAIZE BREAD.

INGREDIENTS.

3 *Tablespoonfuls butter.*
3 *Tablespoonfuls sugar.*

2 *Eggs.*
¼ *Teaspoon salt.*
1 *Cupful sweet milk.*
1 *Cupful flour.*
1 *Cupful maize meal.*
3 *Teaspoonfuls (level) baking powder.*

Rub to a cream butter and sugar, add eggs, and beat until mixture is light. Then add salt and milk and mix well together. Sift together flour, maize meal and baking powder, and add to the mixture in small quantities, whipping until quite light. Bake 25 minutes (hot oven) in a round baking pan.

VIRGINIA SPOON BREAD.

INGREDIENTS.

1 *Quart sweet milk.*
1 *Cupful white maize meal.*
1 *Teaspoonful salt.*
2 *Tablespoonfuls butter.*
2 *Well-beaten eggs.*

Heat 1 pint of milk to boiling point, stir in the meal and salt, and cook for five minutes. Beat in the butter and half cupful of cold milk, add the eggs, and beat once more. Beat in the rest of milk gradually. Put into granite or tin pan and bake for half an hour in a rather hot oven. Be particular to serve at once, in the baking-pan.

BROWN MAIZE BREAD
(BOSTON BROWN BREAD).

INGREDIENTS.

3 *Cups maize meal.*
3 *Cups Boer meal or rye.*
½ *Cup golden syrup.*
1 *Teaspoonful (small) bicarbonate of soda.*
1 *Quart (or 4 cups) water.*

Boil the water, add a little salt, stir in the other ingredients, and boil in a tin steamer or pudding form for 4 hours.

BROWN OR BOER MEAL BREAD.

INGREDIENTS.

1 *Pint boiling water.*
1 *Coffee cup of maize meal.*
1 *Heaping tablespoonful of brown sugar or ½ cup syrup.*

2 *Tablespoonfuls salt dissolved in the water.*
1 *Quart of tepid water with yeast cake dissolved in it or* ¼ *teacup yeast.*
Brown flour or Boer meal to make very stiff.

Let rise in the mixing pan, and, when light, stir in one even teaspoonful of bicarbonate of soda dissolved in a little water. Put into bread-pans, let rise again, then bake for about an hour.

RAISED BREAD.

SALT-RISING MAIZE BREAD.

First make your leaven in the following way:—Take 2 quarts of boiling water, an ounce of salt, and 3 cups of Boer meal. Put the salt into a saucepan, pour on it the boiling water, strew on it gradually the 3 cups of meal, then cover up closely and leave in a warm place overnight. At six o'clock next morning stir into it a cup of boiling water; soon it will begin to ferment. When ready for use it will have a frothy appearance and a disagreeable odour.

I. 2 *Plates of flour or Boer meal.*
2 *Plates maize meal.*
Salt to taste.
Leaven.

Mix with warm water to the required consistency.

II. 3 *Plates Boer meal.*
2 *Plates thin maize meal porridge.*
Salt to taste.
Leaven.

Mix with warm water into a stiff paste. When baked the maize meal will be scarcely perceptible.

RISEN MAIZE BREAD.

INGREDIENTS.

1 *Pint maize meal.*
2 *Cups risen sponge taken from regular baking of wheat bread.*
½ *Cup golden syrup (or 4 tablespoonfuls sugar).*
1 *Teaspoonful soda dissolved in hot water.*
1 *Tablespoonful melted lard.*
1 *Cup white flour, or enough for a stiff batter.*

Mix well, put to rise in buttered mould until very light. Bake 1 hour. It is well to scald the meal and pour while warm.

SOUPS.

CREAM OF MAIZE SOUP.

Score* kernels of six ears of green maize, and scrape pulp; simmer for 20 minutes in kettle with cobs and one pint of water; remove cobs and rub pulp through a sieve. Scald 1 pint of milk with slice of onion and sprig of parsley. Remove these seasonings and add milk to pulp and 2 teaspoonfuls each of butter and flour rubbed together smooth. Season and serve with a small quantity of whipped cream in each dish.

MAIZE SOUP.

Eight ears of maize to eight or ten persons.

Boil the maize on the cobs for 20 minutes or half an hour. Pour off the water, then cut the maize from the cobs and crush with potato masher or pound in a mortar. Add milk according to quantity desired, and flavour with butter, pepper and salt to taste. Boil all together and strain through a sieve.

GREEN MAIZE SOUP.

INGREDIENTS.

1 *Pint raw, grated pulp.*
1 *Pint milk or cream.*
1 *Teaspoonful salt.*
1 *Teaspoonful sugar.*
1 *Teaspoonful flour.*
1 *Tablespoonful butter.*
½ *Saltspoon white pepper.*

Put cobs into cold water to cover them, boil for half an hour, and strain. One pint of water should remain after straining. Put this water on to boil, then add the maize pulp, cook 15 minutes, add salt, pepper, sugar and boiling milk. Boil, and serve. Maize is better for soup when it is rather too old for the table.

CANNED MAIZE SOUP.

INGREDIENTS.

1 *Can of sweet corn.*
1 *Quart (4 cups) of boiling water.*

* "Scoring" of green maize simply means cutting each row of grains downwards through the centre with a sharp knife, and then pressing out the pulp with a blunt knife or the back of a knife.

1 *Quart of milk.*
2 *Eggs.*
3 *Tablespoonfuls of butter.*
1 *Tablespoonful of flour.*
1 *Teaspoonful salt.*
½ *Teaspoon pepper.*

Drain the maize and chop. Put into boiling water and cook 1 hour. Rub through a colander to remove the hulls and return to the fire in the water in which it was boiled. Add salt and pepper, and stir in the butter and flour, which have been rubbed together. Heat the milk to nearly boiling, pour upon the beaten eggs, add to the soup, simmer 1 minute and serve.

MAIZE PUREE.

INGREDIENTS.

12 *Ears of maize, grated.*
1 *Quart chicken broth.*
1 *Small chopped onion.*
1 *Teaspoonful salt.*
1 *Blade mace.*
1 *Saltspoonful white pepper.*
1 *Tablespoonful butter, mixed with*
2 *Tablespoonfuls flour.*

Boil cobs, onion and mace, in water to cover them, for 20 minutes. Take from fire and strain. Heat the broth, add the butter and flour, cook 5 minutes. Add maize pulp, the water, salt and pepper, and cook 10 minutes. Strain and serve. One cup of cream and 1 pint of milk may be used instead of the chicken broth.

CHICKEN AND MAIZE SOUP.

INGREDIENTS.

2 *Quarts chicken broth.*
1 *Pint green maize pulp.*
1 *Cup cream or milk.*
1 *Tablespoonful butter, mixed with*
1 *Tablespoonful flour.*
Salt and pepper to taste.

Remove fat from broth, boil cobs in it for 30 minutes, strain, and return broth to the fire; add pulp, boil 15 minutes; add butter and flour, boil 5 minutes; add cream, bring to boil and serve.

STAMPED MAIZE (OR HOMINY) SOUP.

INGREDIENTS.

1 *Cup stamped maize.*
6 *Cups milk.*
1 *Tablespoonful butter.*
1 *Tablespoonful flour.*
Pepper and salt.

Stand maize in cold water to swell, then boil until very tender. Put milk in saucepan with salt and pepper to taste, and stand in pan of boiling water, or use a "double boiler." Rub the cooked maize through a sieve, or crush fine with a potato masher. Stir into the hot milk. Rub butter and flour to a smooth paste and add. Let the mixture cook a few moments, when it is ready to serve.

Cattle Statistics.

Ideas are very vague on the subject of the numbers of cattle in different countries in the world, and the relative position of Rhodesia to other countries in this respect. The figures given below are rather illuminative in this connection. They are all derived from reliable official sources, but as they vary somewhat in date, the year of each is shewn in order that the reader may make allowances.

The position of the United States has, as is well known, lately undergone a change; from being a meat exporting country, it has become an importer. The great beef exporting nations of the world are the South American States, and, in a less degree, Australasia. Germany was before the war increasingly importing meat, and France was no exporter. Great Britain is the stud farm of the world, but requires enormous supplies of beef, and the demand is likely to increase. The Union of South Africa possesses a very considerable head of cattle, coming about level with Canada, which, even with its much larger white population, has long exported cattle. In the Union, meat export is only a recent innovation, and is supported by supplies from the Protectorates, Southern Rhodesia, and more recently (German) South-West Africa.

Figures relating to certain small cattle-holding countries of more particular interest to us are also given, amongst which it will be seen that our Territory occupies a creditable position. As usual, cattle returns from ranchers and farmers will be asked for at the end of the current year, when it is confidently anticipated that the return will run into seven figures.

Date of Return.	Country.	Head of Cattle.
1913	United States of America	58,386,000
1912	Argentine	29,016,000
	Brazil (recent estimate)	25,000,000
1912	Germany	20,158,738
1911	France	14,552,430
1912	United Kingdom	11,909,469
1911	Australia	11,358,977
1908	Uruguay	8,192,000
1912	Canada	7,103,702
1916	Union of South Africa	7,000,000
	Paraguay	5,500,000
1902	Mexico	5,142,437
1916	(German) East Africa (estimated) ...	3,860,000
1911	New Zealand	2,020,171
1917	Southern Rhodesia	960,000
1916	British S.A. Native Protectorates	870,000
1916	British East Africa	775,000
1917	Northern Rhodesia	213,500
1914	(German) South-West Africa	205,643
1914	Nyasaland	63,467
1916	Portuguese East Africa	40,000

The Agricultural Outlook.

In many districts, notably to the south and west, the end of the dry season was marked by considerable suffering amongst cattle from lack of grass and water, and some mortality occurred from poverty, especially in the case of old animals. The causes were the late arrival of rains and the intense heat prior to their advent, the evil being much aggravated by extensive grass fires in several districts. However, good rains have now fallen in most parts, and the worst time is over. Only those stock owners who make a practice of providing ample hay, succulents and ensilage, as well as making sure of plenty of water by well sinking where necessary, can face with serenity a protracted dry season in Rhodesia.

It is remarkable that in such a season it should be reported that some fields of winter wheat have suffered from rust, owing to the damp, misty weather before the rains. On the other hand, it is easy to understand that potato crops in places have been injured by the great heat. The planting of summer crops was delayed for lack of rains in certain parts, but, generally speaking, ploughing and planting are now in full swing.

Veterinary Report.

September, 1917.

AFRICAN COAST FEVER.

MELSETTER, MREWA AND GWELO DISTRICTS.—No fresh outbreaks, and no cases at any of the existing centres of infection.

SALISBURY DISTRICT.—A fresh outbreak occurred on the farm Highfield, which adjoins the infected farm Waterfall; one animal affected. The Highfield cattle have been under suspicion, and dipped every five days since the outbreak on Waterfall in May last.

VICTORIA DISTRICT.—No fresh outbreaks. At existing centres of infection 38 head were destroyed as diseased.

ANTHRAX.

One case occurred on the farm Dovedale, Salisbury district, and the herd was re-inoculated with a double vaccine.

CONTAGIOUS ABORTION.

One fresh centre of infection was discovered in Salisbury district.

QUARTER-EVIL.

The following mortality in cattle was reported:—Plumtree, 32; Matobo, 16; Inyati, 36; Bulawayo, 9; Nyamandhlovu, 7; Gwanda, 27; total, 127.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 13; donkeys, 10.

TUBERCULIN TEST.

Three heifers *ex* United Kingdom were tested, with negative results.

IMPORTATIONS.

Bulls, 22; heifers, 10 (3 *ex* United Kingdom); horses, 13; donkeys, 10; sheep and goats, 1,210; pigs, 2.

EXPORTATIONS.

Slaughter oxen to Johannesburg *via* Bulawayo, 2,112; *via* Liebig's Drift, 736; horses to Bechuanaland Protectorate, 2; mules to Union, 4; pigs to Union, 93; sheep and goats to Union, 880; to Northern Rhodesia, 75; to Congo, 150.

October, 1917.

AFRICAN COAST FEVER.

SALISBURY, MREWA, MELSETTER AND GWELO DISTRICTS.—No fresh outbreaks, and no cases of disease at any of the infected centres.

UMTALI DISTRICT.—No fresh outbreaks. At the infected farm Engwa one case occurred.

VICTORIA DISTRICT.—No fresh outbreaks, and no cases of disease at any of the infected centres.

QUARTER-EVIL.

The following mortality in cattle was reported:—Plumtree, 36; Matobo, 28; Inyati, 33; Insiza, 46 (includes August and September); Bulawayo, 1; total, 144.

MALLEIN TEST.

The following animals were tested on importation, with negative results:—Horses, 30; mules, 1; donkeys, 11.

IMPORTATIONS.

Heifers, 16; horses, 30; mules, 1; donkeys, 11; sheep and goats, 2,133.

EXPORTATIONS.

Slaughter oxen to Johannesburg *via* Bulawayo, 976; *via* Liebig's Drift, 412. To Union:—Horses, 1; mules, 13; sheep and goats, 1,089;

pigs, 79. To Northern Rhodesia and Congo:—Mules, 4; sheep and goats, 356.

GENERAL.

In various districts a considerable mortality occurred in cattle, as a result of the hard and prolonged winter season and the absence of early rains, and accentuated in many cases by the presence of wire worm and fluke. These parasites are much more prevalent in cattle than is generally realised by stock owners.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

December.

BEE-KEEPING.

Honey in good quantities will still be coming in, as the welcome rains will be beneficial to veld blooms. Continue to give room by extracting honey from shallow frames, then return these to be refilled. Extracted honey should be drawn from the machine into the honey ripener, into which it should be strained through several thicknesses of butter muslin, remaining there, to allow surplus water to evaporate, for five days, then draw off from the tap into clear white glass bottles. All bottles must be cleansed thoroughly. See that ventilation is ample on hot days.

CITRUS FRUITS.

Citrus trees can be planted out at any time between October and the end of January. The best time is the end of October or early November, when the ground is warm and trees have hardened up their first growth of season, *i.e.*, spring growth, and are in fit condition to commence second growth, which they will do if transplanted properly at that time—end of October. Citrus trees should not be planted later than the end of January, as the growth they put on after planting later than this is very liable to be still sappy at the approach of winter, and consequently more sensible to the effect of cold. The young trees require to be well watered after planting. The soil around them should never be allowed to be really dry, but, on the other hand, it must not be kept in a state of sogginess. Immediately after planting protect the stems of the young trees from the

sun by whitewashing or covering up with grass. Cut the tree down so as to leave a stem of about 2 ft. 6 ins. or 3 ft. long, and form the head of the future tree in the top 8 ins. or 1 ft., according to the best position of the shoots, not more than three or four in number. All other growths to be suppressed whenever they appear. Keep the soil nice and loose by digging, forking or hoeing round the young trees. It will then not be necessary to water them so frequently. The orchard should by this time have been thoroughly ploughed, and any cover crop sown already be up and growing. Don't forget, before the wet season, the first ploughing should be up and down the steepest gradient of the orchard, and be followed immediately after harrowing by cross-ploughing across the hill. This is to obviate as much as possible erosion of the soil during the coming heavy rains. Remember that, if a long spell of dry weather occurs during the so-called wet season, your bearing orange trees will probably require an application of water, otherwise the crop of fruit may receive a check from which it will never properly recover.

CROPS.

This is the month when most of the summer farm crops should be sown. If rains have been early, it is sometimes usual to start planting in the latter half of November. There is, however, less risk attached to December plantings, and as there is no danger of early frosts to interfere with the ripening of the plants, it is best not to start planting too early in the season.

Maize planting should be continued this month. Other circumstances permitting, an effort should be made to have the planting completed by the middle of the month. Light harrowing immediately before and shortly after planting will be of great assistance in securing uniform germination and in keeping down weeds, thus giving the young maize plant a good start.

Sunflower, dhal and peanuts should be sown as early as possible, also velvet beans for seed, as these crops require a full season to attain maturity. Wheat and oats may be sown as summer crops during the whole of this month. Other crops, such as teff grass, linseed, millet, buckwheat, majorda melons, and mangels may be sown at any time during the month. The main crop of potatoes should be put in from the middle of the month onwards.

ENTOMOLOGICAL.

Maize.—Surface beetles may be very injurious if seed is planted in dry soil during December. See "The Dusty Surface Beetle," *Agricultural Journal*, August, 1914. Cutworms and stalk borer are likely to be in evidence. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912.

Tobacco.—The newly planted crop is subject to the attack of surface beetles, stem borer, leaf miner, "wireworms," grasshoppers, large crickets, etc. A good deal of protection may be obtained by dipping the tops of the transplants as far as the roots in arsenate of lead 1 lb.—15 galls. water. See "Handbook of Tobacco Culture," published by the Agricultural Department, pp. 71-90.

Potato.—Ladybirds may be injurious to the foliage. See "Two Ladybirds injurious to Potato Plants," *Agricultural Journal*, October, 1913. On sandy soils blue blister beetles may be troublesome. An immediate spraying with arsenate of lead 1 lb.—12 galls. water should give relief.

Cabbage, Turnip, etc.—Webworm and diamond back moth are still the main pests. See "Cabbage Webworm," *Agricultural Journal*, February, 1914. Dusting with paris green and lime will give protection against both pests.

Bean.—Stem maggot may be serious in December, especially if previous crops have been grown for French beans in gardens. See "Bean Stem Maggot," *Agricultural Journal*, April, 1913.

Melon, Marrow, etc.—Leaf-eating beetles frequently destroy the very small plants entirely. Spray with an arsenical wash or cover the young plants.

Deciduous Trees.—Chafer beetles and fruit beetles are commonly very troublesome. See "Chafer Beetles," *Agricultural Journal*, December, 1914.

Fig.—Collect and destroy all fruit infested with fig weevil.

FLOWER GARDEN.

This month is generally showery, and constant stirring of the soil is, therefore, necessary to keep it loose. Seeds of perennials and annuals for February blooms may be sown. Transplanting should be done in the evening on a cloudy day. Carnations should be kept free from dead wood, and climbers attended to.

FORESTRY.

Give the ground the final harrowing, and if the season is a normal one, planting out should commence. This is the ideal month for planting out in a normal season, as the young trees have the benefit of all the summer rains, and become well established before the dry winter months arrive. Plant on dull, rainy days, or failing such days, late in the afternoons.

POULTRY.

Thoroughly clean and overhaul all brooders, coops and chick houses not in use, and store away ready for next season. Do not continue hatching from moulting birds. If possible, pen up separately all the breeding cockerels. Remove the birds from all breeding pens and small runs. Dig over the ground and plant a crop. Dispose of all surplus cocks and old hens.

STOCK.

Cattle.—The veld everywhere is now good, and little trouble in respect of grazing is likely to be experienced. Ranching cattle will require little attention beyond dipping, but any stock that are in poor condition should be kept near home and given a ration of hay and possibly mealies daily. The bulls should be returned to the herd, either at the end of the month or in January, and it should be remembered that the better they are conditioned and fitted for their work the more hope there is of a good crop of calves. For this reason also, every effort should be made to have all female breeding stock in good condition. The dairyman will find that a ration of mealies and hay, and oil cake, if he can afford it, will repay him in spite of the fact that grass is plentiful. The oil cake will be found especially valuable where the production of cream or butter is the object in view. Milch cows should be protected as much as possible from cold rains and hot sun. A lean-to shed, well bedded up, will increase the milk supply, especially in periods of protracted rainfall. The calf pen should be kept clean, dry and sweet, and calves should be kept in in hot or very wet weather. Dip regularly.

Sheep.—Graze on higher lying lands, keep the kraals clean, dry and airy and watch for ticks.

TOBACCO.

Continue transplanting and cultivating that which has been transplanted. Harrow and cultivate the fields that are to be planted out and have had rain since the last cultivation, so as to have them loose and light for the reception of the plants. Never neglect the tobacco that has been set out to transplant—rather encourage it in every way by cultivation and early fertilisation to grow and come to maturity in 90 to 100 days after transplanting.

VEGETABLE GARDEN.

All vegetable seeds may be planted. All advanced plants should be constantly cultivated. Potatoes should be ridged, and peas, beans and tomatoes staked. This is a good month for planting the main crop of potatoes.

VETERINARY.

Occasional cases of horsesickness may occur during this month. With the great increase in ticks, due to the heat and moisture, cases of redwater and gallsickness may be expected, more especially amongst Colonial stock imported since the last rainy season. The cool weather which frequently follows the early rains is an excellent time for castrating calves and other animals.

WEATHER.

In Mashonaland usually six inches of rain fall this month, and in Matabeleland five inches, but considerable variations occur. Less rain usually falls at this time in extreme southern parts of the country. Very heavy downpours may be looked for, and it is well to be provided by drains and ditches against the effects of heavy rain storms. A dry spell about Christmas time is a very frequent, though not invariable, event in Rhodesia. This partial drought may last only a fortnight or may extend to six weeks; in the latter event often causing some anxiety regarding young crops, especially those not yet through the ground. The best means of meeting this condition of the weather is by frequent surface cultivation by harrow or horse hoe, to preserve a loose soil mulch on the surface and prevent losses of soil moisture by evaporation.

January.

BEE-KEEPING.

Where it is desirous, artificial swarms can now be made, so also can nuclei be formed from proved best working strains. All the above must be stimulated with food. In the cooler districts it will be necessary to contract the entrances and close down for winter.

CITRUS FRUITS.

See under December notes.

CROPS.

Sowings of wheat may be continued up to the middle of this month, and teff grass and buckwheat may be sown up to the end of the month. Planting of main crop of potatoes may be continued, according to the moisture in the soil, up to the end of the month.

ENTOMOLOGICAL.

Maize.—This crop is subject to the attack of stalk borer, black chafer beetle (*Heteronychus*) and white grubs during this month. Information concerning most of these pests may be obtained by reference to "Insect Pests of Maize" in the issue of the *Journal* for June, 1912. Seed planted during this month is liable to suffer from surface beetles. See "The Dusty Surface Beetle," *Agricultural Journal*, August, 1914.

Tobacco.—Most of the pests of this crop are active during January, *e.g.*, stem borer, leaf miner, "wireworms," surface beetles, large crickets.

grasshoppers. Tobacco pests are discussed on pp. 71-90 of the "Handbook of Tobacco Culture," published by the Department of Agriculture.

Potato.—Certain ladybirds are apt to defoliate the young potato plants of the main crop, especially on farms where early potatoes are also grown. See *Agricultural Journal*, October, 1913. Blue blister beetles are apt to be injurious on sandy soils, and may be checked by spraying with arsenate of lead 1 lb. to 12 gallons of water. Spraying should be commenced for early blight. See *Agricultural Journal*, August, 1913.

Cabbage Family.—Plants of this family are subject to the attacks of webworm and sawfly in January. See *Agricultural Journal*, February, 1914; April, 1910; April, 1911.

Beans and Cowpeas.—These suffer chiefly from stem maggot. See *Agricultural Journal*, April, 1913. Aphis may be checked by spraying with tobacco wash or paraffin emulsion.

Melon Family.—The chief pests in January are leaf-eating beetles. Spray with an arsenical wash or cover young plants.

Citrus Trees.—The fruit is subject to the attack of citrus codling. Collect and destroy the infested fruit.

Deciduous Fruits.—These are all subject to the attack of fruit-eating beetles. See "Chafer Beetles," *Agricultural Journal*, December, 1914. Fruit moths are injurious during this month, the only preventive measure being to net the trees. For fruit fly remedies, see *Agricultural Journal*, August, 1911.

Fig.—The adult beetles of the fig borer are to be found on the young shoots. They should be destroyed. The grubs in the stems may be killed with a little carbon di-sulphide.

FLOWER GARDEN.

This month requires all one's energy in the flower garden. Annuals may still be sown for late flowering before the season is over. Planting out should be done as early as the weather permits, and advantage taken of a dull day after a shower for this work. If care be exercised much smaller plants may be put out than would at first be thought advisable, as with attention these will make stronger plants than larger ones, which are more likely to receive a check. The soil requires constant stirring, owing to the packing caused by the rains and for the eradication of weeds, which are now very troublesome. All plants should be kept free of dead and decaying matter.

FORESTRY.

If the rains are seasonable, plant out evergreen trees, such as gums, cypress, pines, etc. Fill in all blanks as soon as they are noticed, and do not leave them until the following season. Planting should be done on a wet day, or failing that, on a dull day, or late in the afternoons.

POULTRY.

Provide the pullets with proper houses if eggs are wanted. Moulting birds must be housed in good dry houses if they are to moult out satisfactorily and come on to lay again as soon as possible. Do not miss the evening feed because it is raining. It is better to feed at two or three o'clock, if the weather looks threatening, than not at all. Read notes on treatment of moulting birds in the *Agricultural Journal* of February, 1915.

STOCK.

Cattle.—The recommendations for December apply equally to this month. Ranchers will return the bulls to the herd some time this month, with a view to having the calving season commence in the latter part of September or October.

Sheep.—Continue as recommended for December. If heavy rains have been experienced a few mealies to the ewes will keep them in condition and will often prevent much trouble arising from poverty and anæmia. Those who favour autumn lambs should remember that it will be necessary to put the ram with the flock again in February, and should make arrangements in time. In this connection, a little extra feed, as recommended above, will help to fit the ewes for mating, and will often bring the flock into season more or less together, and will then avoid a prolonged lambing season.

TOBACCO.

Cultivation should continue, and all small and weak-looking plants should have special attention, so as to bring them to maturity with the rest of the field. In most districts in Rhodesia the early planted tobacco is the best; if there has been sufficient rain to allow of the whole crop being transplanted by the end of December or 15th of January, so much the better, and unless the rain is very late, in which case we look for a late season, it is better to stop after the 15th of January, even though the full crop has not been set out. The flue barns should be looked after, and got in readiness for the curing season.

VEGETABLE GARDEN.

Turnips, carrots, cabbage, lettuce, etc., may be sown for carrying on during the winter months. Potatoes may be planted this month for keeping through the winter. Weeding and cultivating between the rows should be continually carried on.

VETERINARY.

Horsesickness may now be expected, especially in districts where early heavy rains have occurred. Blue tongue in sheep will also be prevalent.

WEATHER.

Heavy rain is to be looked for, and during this month we may normally expect nine to twelve inches on the eastern border, seven-and-a-half in the north, and less as one travels westwards or southwards. At this time of year the rainfall tends to be heavier in the eastern than in the western portions of the Territory, whilst prolonged steady rains take the place of the thunder showers which marked the earlier part of the wet season. The growing period is at its height, and high temperatures are registered.

Weather Bureau.

EVAPORATION, CLEVELAND RESERVOIR, SALISBURY.

Year.	Month.	Monthly Evaporation. Inches.	Daily Maximum. Inches.	Daily Minimum. Inches.	Daily Mean. Inches.
1917	September	9·07	0·35	0·27	0·30
1917	October	11·63	0·45	0·29	0·37

TEMPERATURES.

Station	September		October	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MASHONALAND—				
Charter—				
Enkeldoorn	82·0	45·0	89·0	49·7
Hartley—				
Gatooma	88·7	57·2	95·6	62·8
Hallingbury Farm	85·4	50·3	92·2	56·6
Hartley Hospital	88·6	51·0	95·6	58·1
Idaho Farm	—	—	—	—
Lomagundi—				
Eldorado Mine	88·8	66·3	94·3	73·2
Sinoia	89·1	64·0	94·0	66·7
Sipolilo	—	—	—	—
Mangwendi—				
Kwenda Hospital	—	—	—	—
Mazoe—				
Shamva Mine	—	—	—	—
Melsetter—				
Melsetter	73·9	48·7	81·6	53·2
Mount Selinda	74·9	51·1	81·9	55·0
Vermont	74·2	53·6	81·7	56·7
Salisbury—				
Chishawasha	83·1	48·1	89·6	53·3
Salisbury (Gaol)	83·2	47·4	89·5	51·5
Umtali—				
Public School	80·3	55·0	—	—
Summerfield	—	—	—	—
Victoria—				
Eythorne	77·3	48·9	89·0	56·2
Morgenster	—	—	—	—
Victoria	79·2	51·1	88·3	56·9

TEMPERATURES—*(Continued).*

Station	September		October	
	Mean Max.	Mean Min.	Mean Max.	Mean Min.
MATABELELAND—				
Bulalima-Mangwe—				
Empandeni	87·0	54·2	95·1	57·5
Garth	84·6	55·5	93·2	61·0
Plumtree School	—	—	—	—
Retreat	90·5	56·0	99·5	65·2
Bulawayo—				
Observatory	80·6	52·9	—	—
Gwanda—				
Antelope Mine	84·4	57·3	92·1	63·0
Mazunga	84·5	67·6	—	—
Tuli	—	—	—	—
Gwelo—				
Gwelo	87·1	56·5	101·1	65·4
Gwelo (Gaol)	82·7	45·1	90·2	55·9
Matobo—				
Holly's Hope	85·3	53·9	94·1	60·0
Rhodes Matopo Park ...	85·9	53·7	95·09	60·2
Nyamandhlovu—				
Riverbank	66·5	54·5	74·5	59·3
Umzingwane—				
Essexvale	75·0	51·4	59·2	58·8
Hope Fountain	—	—	—	—
Wankie—				
Victoria Falls	91·0	54·0	97·6	63·6
Wankie (Hospital)	87·5	63·0	102·0	71·8

RAINFALL.

Station	September	October
MASHONALAND—		
Charter—		
Buhera	Nil	0·32
Bushy Park	—	0·34
Enkeldoorn Gaol	Nil	0·43
Marshbrook	0·10	0·16
Range	0·13	0·35
Riversdale	Nil	Nil
Umniati	,,	—
Vrede	—	0·25
Wylde Grove	Nil	—
Chibi—		
Chibi	—	0·40
Nuanetsi Ranche	—	Nil
Chilimanzi—		
Central Estates	Nil	0·28
Chilimanzi	,,	0·28
Driefontein	,,	0·08
Induna Farm	,,	0·22

RAINFALL—*(Continued).*

Station	September	October
MASHONALAND—(Continued)		
Chilimanzi—continued		
Orton's Drift	Nil	0·50
Umvuma (Railway)	,,	Nil
Darwin—		
Mount Darwin	Nil	0·22
Gutu—		
Chingombe	Nil	0·15
Eagle's Nest Ranche	0·42	—
Gokomere	Nil	0·10
Gutu	,,	0·06
Hartley—		
Ardgowan	Nil	0·33
Auchter Leny	,,	0·50
Battlefields (Railway)	,,	0·40
Carnock Farm	0·11	0·17
Elephant Hill, Battlefields	—	—
Elvington	0·03	0·38
Gadzema (Railway)	Nil	Nil
Garthnor	—	—
Gatooma	Nil	0·54
Gatooma (Railway)	,,	0·15
Gowerlands	0·13	0·51
Hallingbury Farm	Nil	0·10
Hartley Hospital	,,	0·18
Hartley (Railway)	,,	0·13
Hopewell	—	0·12
Idaho Farm	—	—
"Jenkinstown"	—	—
Makwiro (Railway)	—	—
Philiphaugh	—	0·02
Shagari	Nil	0·29
Spitzkop	,,	Nil
Inyanga—		
Inyanga	Nil	0·24
St. Trias' Hill	0·14	0·17
Lomagundi—		
Argyle	—	—
Banket Junction (Railway)	Nil	0·59
Darwendale	,,	0·38
Duxbury Farm	0·08	0·24
Eldorado Mine	Nil	0·11
Eldorado (Railway)	,,	0·26
Lion's Den	—	—
Lone Cow Estate	—	—
Longmead	Nil	0·09
Maningwa	0·21	0·10
Mikore	—	0·66
Palm Tree Farm	Nil	0·25
Sinoia	,,	0·26
Sinoia (Railway)	,,	Nil
Sipolilo	—	—
Umvukwe Ranche	—	—

RAINFALL—(*Continued*).

Station	September	October
MASHONALAND—(Continued)		
Makoni—		
Carlow Farm	—	—
Chimbi Source	—	—
Delta	0·06	0·47
Eagle's Nest	Nil	—
Ellavale	0·07	0·20
Gorubi Springs	Nil	0·07
Headlands (Railway)	,,	Nil
Mona	0·07	0·06
Monte Cassino Mission	Nil	Nil
Odzi (Railway)	,,	0·67
Rusape (Railway)	,,	Nil
Springs	0·07	0·30
York Farm	—	Nil
Marandellas—		
Bonongwe...	0·11	0·44
Huish Estate	0·08	0·29
Kwenda Hospital	—	—
Land Settlement Farm	0·07	0·39
Macheke (Railway)	Nil	Nil
Marandellas	—	—
Marandellas (Railway)	Nil	0·15
Nelson	0·15	0·16
Selous Nek	Nil	0·15
Theydon	,,	0·07
Tweedjan	,,	0·25
Verdoy	—	—
Mazoe—		
Avonduur	0·70	Nil
Bindura	0·22	0·15
Bindura (Railway)	0·13	0·07
Ceres	1·09	0·66
Chipoli	0·09	Nil
Citrus Estate	0·20	0·05
Dunmaglas	—	—
Jumbo (Railway)	—	—
Kilmer	—	—
Kingston	0·22	0·22
Laguaha	—	—
Lowdale	—	—
Mazoe	Nil	Nil
Mguta Valley	—	—
Omeath	Nil	0·23
Protea Farm	—	—
Ruia	—	0·26
Ruoko Ranche	Nil	0·50
Shamva	—	Nil
,, Mine	—	—
Stanley Kop	0·08	0·13
Sunnyside	—	—
Teign	0·05	0·18
Virginia	0·95	—
Volynia Ranche	—	—

RAINFALL *(Continued).*

Station	September	October
MASHONALAND—(Continued)		
Mrewa—		
Glen Somerset	Nil	0·08
Mrewa	—	—
Mtoko—		
Makaha	0·02	0·02
Mtoko	Nil	0·08
Melsetter—		
Brackenburg	1·23	Nil
Chikore	1·13	0·20
Chipinga	0·06	0·06
Helvetia	2·05	Nil
Melsetter	0·86	0·15
Mount Selinda	2·03	0·16
Mutambara Mission	—	—
Pasture	1·56	—
Tom's Hope	1·00	0·24
Vermont	2·45	0·02
Ndanga—		
Bikita	0·86	0·10
Chiredzi Ranche	1·06	—
Marah Ranche	Nil	0·10
Ndanga	0·49	0·51
Pamushana	0·26	0·14
Salisbury—		
Ardbennie	Nil	0·12
Avondale	,,	0·12
Botanical Experiment Station	—	—
Bromley	Nil	0·38
Brookmead	—	—
Borrowdale (Hatcliffe)	—	—
Chishawasha	0·06	0·55
Cleveland Reservoir	Nil	0·21
Ewanrigg	—	—
Forest Nursery	Nil	—
Glenara	—	—
Goromonzi	Nil	0·38
Gwebi	,,	0·42
Hillside	0·02	0·14
Lilfordia	Nil	0·74
Salisbury (Gaol)	0·04	0·12
,, (Railway)	0·04	0·12
Sebastopol	Nil	0·39
Selby	—	—
Stapleford	—	—
Sunnyside	0·11	0·27
The Meadows	Nil	0·26
Vamona	,,	0·06
Westridge	0·02	0·11
Umtali—		
Odzani	0·42	0·06
Penhalonga	1·49	0·05
Premier Estate	0·03	0·68
Public School	0·29	—

RAINFALL *(Continued).*

Station	September	October
MASHONALAND—(Continued)		
Umtali—continued		
Sarum	—	—
Stralsrund	Nil	Nil
Summerfield	—	—
Umtali (Railway)	0·26	—
Utopia	0·07	0·10
Urungwe—		
Nassau Estate	0·05	0·21
Victoria—		
Brucehame	Nil	0·11
Clipsham	,,	0·16
Empress Mine	—	—
Eythorne	0·04	0·25
Fairburn	0·03	0·57
Fort Victoria (Railway)	Nil	0·37
Marthadale	—	—
Makorsi River Ranche	Nil	1·00
Morgenster	—	0·14
Silver Oaks	0·03	0·25
Victoria	Nil	0·28
MATABELELAND :		
Belingwe—		
Tamba	0·15	0·40
Wedza	0·24	0·31
Bubi—		
Bembesi (Railway)	Nil	0·34
Imbesu Kraal	,,	0·50
Inyati	,,	0·04
Maxim Hill	—	0·63
Shangani Estates	Nil	0·05
Bulalima-Mangwe—		
Empandeni	Nil	0·39
Garth	0·05	0·30
Mholi (late Magot)	Nil	0·06
Plumtree School	—	—
Retreat	0·07	0·13
Riverbank Farm	Nil	0·44
Solusi Mission	,,	0·32
Syringa	,,	0·06
Tjompanie	0·05	0·14
Bulawayo—		
Government House	—	—
Keendale	Nil	0·30
Khami	,,	0·39
Lower Rangemore	,,	0·22
Observatory	,,	—
Raylton (Railway)	,,	0·42
Umgusa	—	—
Umkien	—	—
Gwanda—		
Antelope Mine	0·07	0·08
Gwanda (Gaol)	Nil	0·32

RAINFALL *(Continued)*

STATION	September	October
MATABELELAND—(Continued)		
Gwanda—continued		
Gwanda (Railway)	0·08	0·38
Lamulas	0·08	Nil
Langalanga	0·08	0·07
Makalali	0·03	0·03
Manantji	0·17	Nil
Mapande	0·13	,,
Mazunga	0·17	0·15
Mtshabzi Mission	Nil	0·59
Tuli	,,	Nil
West Nicholson (Railway)	0·06	0·15
Gwelo—		
Daisyfield	—	0·32
Dawn	Nil	0·09
Globe and Phœnix Mine	0·05	0·05
Globe and Phœnix (Railway)	0·02	0·06
Gwelo (Gaol)	Nil	0·12
Gwelo (Railway)	,,	0·14
Hunter's Road	,,	0·22
Lalapanzi (Railway)	,,	0·15
Lovers' Walk	—	0·27
Lower Gwelo	Nil	0·02
Oaklands	—	0·44
Rhodesdale Estate	Nil	0·22
Sikombela Farm	,,	0·66
Woodendhove	—	—
Insiza—		
Albany	Nil	0·12
Filabusi	,,	0·73
Fort Rixon	,,	—
Infiningwe	,,	1·36
Insiza (Railway)	,,	0·06
Inyezi Farm	—	0·24
Orangevale	Nil	Nil
Roodeheuvel	,,	0·08
Shangani (Railway)	,,	0·18
Thornville	,,	0·20
Matobo—		
Holly's Hope	0·08	0·10
Matopo Mission	Nil	0·51
Rhodes Matopo Park	,,	0·28
Nyamandhlovu—		
Gwaai (Railway)	Nil	0·10
Edwaleni	—	0·22
Impondemi	—	—
Melinakanda Junction	Nil	0·75
Naseby Farm	,,	0·13
Nyamandhlovu (Railway)	,,	0·22

RAINFALL *(Continued).*

Station	September	October
MATABELELAND—(Continued)		
Sebungwe—		
Gokwe	—	—
Inyoka	Nil	0·07
Selukwe—		
Hillingdon	0·02	0·42
Selukwe (Railway)	0·06	0·07
Tokwe River Ranche	1·10	—
Tokwe Section	—	0·71
Umzingwane—		
Balla Balla (Railway)	Nil	1·77
Crombie's	,,	1·01
Essexvale	,,	1·18
Heany Junction (Railway)	,,	0·93
Hope Fountain	—	—
Springs Farm	—	0·69
Wankie—		
Bombusi	—	—
Dett (Railway)	—	0·25
Malindi (Railway)	—	—
Victoria Falls	Nil	0·28
Victoria Falls (Railway) ...	,,	0·43
Wankie Hospital	,,	0·07
Wankie (Railway)	,,	Nil

— No return.

Dates of Meetings of Farmers' Associations, Southern Rhodesia

(SUBJECT TO ALTERATION)

Name of Association	Place of Meeting	Secretary	1917	1918	
			December	January	February
Beatrice Road	Various farmhouses	H. W. Harris	12	9	13
Bembesi	Queen's Mine Hotel	V. C. Andrews	7	4	1
Bindura	Bindura	C. J. Glen	8	12	9
Bromley	Bromley	A. A. Draper	6	3	7
Charter—Mgezi	Beatrice Mine	W. Krienke	26	30	27
Central	Umvuma	— James	29	26	23
Eastern Border (South Melsetter)	Helvetia	J. T. Jollie	14	11	8
Enterprise	Arcturus Hotel	J. G. M. Bernard	5	2	6
Felixburg	Felixburg	R. H. Brown	8	12	9
Figtree Branch, R.L. and F.A.	Figtree Hotel	W. H. Robertson	1	..	2
Gatooma	Gatooma	T. J. Golding	15	19	16
Gazaland	Chipinga	W. Wood	29	26	23
Greystone	Various farm houses, Shangani	M. Kerr	8	12	9
Hartley	Hartley	J. de L. Nimmo	29	26	23
Headlands	Headlands	J. M. Harvard	29	..	23
Hunter's Road Farmers and Stockowners	Hunter's Road Siding	R. H. Twilley	8	12	9
Insiza—Shangani	Shangani	T. E. Penny	1	..	..
Inyanga	Farm Cheshire	F. W. Thiel	29	26	23
Inyazura	Inyazura	A. C. Curling	19	16	20
Iron Mine Hill	Iron Mine Hill	T. Irving	8	12	9
Lalapansi	Lalapansi	N. A. Bradford	15	19	16
Lomagundi	Sinoia	A. H. Layard	15	19	16
Lydiate	Norton	W. Wrench	29	26	23
Macheke	Macheke	J. Cheyne	No	fixed dates	
Makwiro	Makwiro	C. D. Voigt	21	18	15
Marandella and Mangwendi	Marandellas Farmers' Hall	A. Nicholson	1	5	2
Makoni	Rusape	H. Barnes Pope	1	5	2
Makoni North	Makoni North	———	29	26	23
Mashonaland	Commercial Hotel, Salisbury	J. Reid Rowland	5	2	6
Matopo Branch, R.L. and F.A.	Sibali	———	..	9	..
Mazoe	Glendale Siding	A. G. McCall	12	9	13
Melsetter (North)	Various farms	N. N. Rutherfurd	1	..	..
Midlands	Gwelo	A. Cox, Box 93, Gwelo	14	11	8
Northern Umtali	Farm Summerfield	R. O. H. Blurton	..	..	2
Norton and District	Norton Store	H. Grimmer	1	5	2
Que Que	Que Que	E. J. Ross	15	19	16
Rhodesian Landowners and Farmers	Library Buildings, Bulawayo	H. S. Hopkins	28	25	22
Shamva	Shamva	Wm. Scott	..	16	..
Selukwe	Selukwe	F. S. Clark	o	fixed dates	
Somabula and Shangani Flats	Weltevrede School	G. B. Botha	..	12	..
Umvukwe	Various ranches	H. K. Bracewell	8	..	..
Umtali	Christmas Pass Hotel	J. S. Holland	1	5	2
Victoria	Victoria	John Rennie	7	4	1
Vungu	Vungu	J. H. Erasmus	..	..	..
Western	Plumtree Hotel	A. Barclay	8	12	9

Departmental Notices.

The full series of notices usually published under this head no longer appears, and will be omitted in future. New notices and amendments of old ones will be published from time to time. The departmental announcements with which our readers are familiar, nevertheless, remain in force as before. The services of the officers of the Department are always available, whether it be for replying to enquiries or by personal visits to farms or by lectures to associations. Full particulars can be obtained from the Director of Agriculture, Salisbury, in reference to any of the subjects previously dealt with in these pages, such as supply of seeds and trees, co-operative seed distribution, insect pests, chemical analyses, and technical advice on veterinary matters, irrigation, citrus culture, poisonous plants and plant identification, examination of soils, dips, products, etc.; and generally on all questions relating to live stock and to tillage operations.

Farm Seeds

The undermentioned seeds grown on the Government Experiment Farms are offered for sale at the prices stated. The amounts available are limited.

The prices quoted are f.o.r. Salisbury, or, when available, from the Gwebi Experiment Farm. The distribution of seed will commence from the 1st September, except in the case of Napier's fodder, which will be distributed from the 1st December only. Napier's fodder will be sold in bags containing approximately 200 roots, but no guarantee can be given of the exact number contained in each bag.

On account of the limited supply available in some cases, it is impossible to guarantee the full delivery of any order. *Farmers are therefore requested not to enclose cheques until they are advised as to the amount of seed allotted to them.* The seeds are consigned carriage forward in the case of stations. In the case of sidings the amount of railage will be notified after despatch.

All orders for seed must be addressed to the Government Agriculturist, Department of Agriculture, Salisbury.

1. Boer manna seed, 3d. per lb.
2. Buckwheat (Japanese), 10s. per 100 lbs.
3. Castor oil beans, 2d. per lb., 15s. per 100 lbs.
4. Dhal (ordinary), 2d. per lb., 15s. per 100 lbs.
5. Sudan grass seed, 2s. 6d. per lb.
6. Sunflower (black seeded), 2d. per lb., 15s. per 100 lbs.
7. Napier's fodder roots, 5s. per bag containing approximately 200 roots.

Forest Nursery—Sale of Trees

A list of the trees and shrubs available for sale, with prices, may be obtained on applying to the Assistant Agriculturist, Salisbury.

Services of Government Veterinary Surgeons

1. The services of Government Veterinary Surgeons are available to the public, free of charge, for the following purposes only:—

(1) Attending and giving professional advice in connection with the following diseases, viz.:—Anthrax, Contagious Abortion, East Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Foot-rot, Heartwater, Glanders, Intestinal Parasites amongst sheep and goats, Liver Disease, Lungsickness, Osteo Porosis, Malarial Catarrhal Fever (blue tongue), Rabies, Rinderpest, Scabies, Sponziekte (quarter-evil), Swine Fever, and any other diseases which may in future be scheduled in terms of section 3, sub-section 18 of the "Animals Diseases Consolidation Ordinance, 1906." Attending to cases of disease amongst live stock which, though not of a contagious or infectious character, may be of general public importance.

(2) Applying tests in regard to Glanders, Tuberculosis, or any other disease against the introduction or spread of which tests are applied under regulations.

(3) Inoculations against the following diseases:—
Horsesickness, Lungsickness, Anthrax, Quarter-evil, Redwater, Malarial Catarrhal Fever (blue tongue). A fee to cover the cost of serum and virus will be charged.

2. The following charges shall be made and payable for services rendered by the Government Veterinary Surgeons in other cases, viz.:—

	£	s.	d.
(1) For every professional visit within three miles of his office or residence	0	5	0
(2) For every professional visit beyond such distance plus an additional charge of 2/6 per hour whilst engaged in such visits or £2 2s. a day of 24 hours;	0	10	6
(3) For advice given at the Veterinary Surgeon's office, for each animal, per visit	0	2	6
(4) The following to be charged in addition to visiting fees:—			
a. For every examination as to soundness, each	1	1	0
b. For castration, horses, each	1	1	0
c. For castration, bulls, each	0	5	0
d. For castration, donkeys, each	0	10	6
e. For parturition cases, mares, each	2	2	0
f. For parturition cases, cows, each	1	1	0
g. For other operations, according to nature, from 5s. to £2 2s.			

3. Double the above fees will be payable for services rendered on Sundays, public holidays, and between the hours of 7 p.m. and 7 a.m.

4. Applicants for the services of Government Veterinary Surgeons must at their own cost provide the necessary transport for the conveyance of these officers from, and back to, their residence or nearest railway station.

5. Farmers and owners of stock throughout the country frequently telegraph for a Government Veterinary Surgeon to be sent to attend an animal which has been taken seriously ill. It is rarely possible to comply with these requests at once, as the Veterinary Surgeon may be engaged on duty which he cannot leave, or is at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the veterinary staff discredited. To obviate this, in all cases where veterinary advice and assistance are required, the owner should telegraph to "Veteran," Salisbury, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This will enable the Chief Veterinary Surgeon to telegraph advice at once and state whether he is able to arrange for veterinary attendance on the case or not, and save valuable time, which is always of importance in acute cases.

6. The services of Government Veterinary Surgeons will only be available for private work with the consent of such officers, and when such work does not interfere with their official duties, or when the services of a private practitioner are not available.

7. As the arrangement of allowing Government Veterinary Surgeons to attend to private cases is intended purely for the benefit of farmers and stock owners who may wish to obtain professional advice, no responsibility whatever will be accepted for any loss of stock, etc., which may result from the negligent treatment or advice, or wilful default, of any Government Veterinary Surgeon.

8. All fees to be payable direct to the Government Veterinary Surgeon concerned.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only:—

AGRICULTURE.

No. 61. Requirements in sending Botanical Specimens to the Department for Identification.
No. 62. Services of Agricultural Engineer.
No. 64. Hints on Irrigation—Small Gravitation Schemes, by W. M. Watt.
No. 81. Possibilities of Export Trade in Oil Seeds, by H. Godfrey Mundy, F.L.S.
No. 90. Reports on Experiments—Experimental Station, Salisbury, 1910-1911, by J. H. Hampton.
No. 94. Second Report on Experiments, by J. H. Hampton.
No. 155. The Manuring of Maize on the Government Experimental Farm, Gwebi, 1912-13.
No. 160. Hints on Irrigation—Pumping Plants, by W. M. Watt, Agricultural Engineer.
No. 177. Notes on the Raising of Seedling Trees, by F. B. Willoughby.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 192. A Calendar of Crop Sowings, by H. Godfrey Mundy, F.L.S.
No. 203. Ensilage, by J. A. T. Walters, B.A., and The Feeding of Ensilage to Dairy Cattle in Winter, by R. C. Simmons.
No. 206. Hints on Irrigation: Small Earthen Storage Reservoirs, by W. M. Watt.
No. 212. Citrus Fruits in Rhodesia, by A. G. Turner.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 218. Useful Measurements of Maize, by J. A. T. Walters, B.A.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 222. Costs of Farm Operations, Gwebi.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 240. Manuring of Maize and Fertiliser Experiments at Gwebi, by A. G. Holborow, F.I.C.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 300. The Dangers and Prevention of Soil Erosion, by W. M. Watt.
Tree Culture in Southern Rhodesia, by P. B. S. Wrey, A.M.I.C.E.

CROPS.

No. 88. Chicory Growing, by H. Godfrey Mundy, F.L.S.
No. 126. Turkish Tobacco.
No. 132. Sumatra Tobacco, Hints to Rhodesian Growers, by C. J. Sketchley.
No. 138. Tobacco Culture (Virginia)—Harvesting and Curing.

No. 170. Production of Pedigree Seed—Maize, by H. Godfrey Mundy, F.L.S.
No. 174. Notes on Hop Growing, by H. Godfrey Mundy, F.L.S.
No. 175. Notes on Lucerne, by H. Godfrey Mundy, F.L.S.
No. 176. The Cultivation of Castor Oil Beans, by H. Godfrey Mundy, F.L.S.
No. 179. Buckwheat, by H. G. Mundy, F.L.S.
No. 181. Sunflower Cultivation, by H. G. Mundy, F.L.S.
No. 188. The Ground-Nut or Monkey Nut, by H. Godfrey Mundy, F.L.S.
No. 193. Oats in Southern Rhodesia, by H. Godfrey Mundy, F.L.S.
No. 194. Rye, by J. A. T. Walters, B.A.
No. 201. Dhal or Pigeon-Pea, by J. A. T. Walters, B.A.
No. 207. Crop Rotation in Southern Rhodesia, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch-Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 244. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 251. Cultural Notes on Onions, by J. A. T. Walters, B.A.
No. 252. Cultural Notes on Buckwheat, by J. A. T. Walters, B.A.
No. 253. Wheat Production in Southern Rhodesia.
No. 258. Winter Wheat, by J. A. T. Walters, B.A.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.

ENTOMOLOGY AND VEGETABLE PATHOLOGY.

No. 43. Citrus Psylla.
No. 75. Fumigation of Fruit Trees with Hydrocyanic Acid Gas, by R. W. Jack, F.E.S.
No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.
No. 140. Insect Pests of Tobacco in Southern Rhodesia, by R. W. Jack, F.E.S.
No. 142. The Bean Stem Maggot, by R. W. Jack, F.E.S.
No. 147. Root Gallworn, by R. W. Jack, F.E.S.
No. 148. Darkling Beetle Grubs Injurious to Tobacco, by R. W. Jack, F.E.S.
No. 151. Potato Spraying Experiments for the Control of Early Blight, by Rupert W. Jack, F.E.S.
No. 154. Borers in Native Timber—Results of Experiments with Preservatives, by Rupert W. Jack, F.E.S.
No. 158. Two Ladybirds Injurious to Potato Plants, by R. W. Jack, F.E.S.
No. 171. The Cabbage Web-Worm—A Pest of Cabbage and Allied Plants, by R. W. Jack, F.E.S.
No. 172. Diseases of the Potato Tuber and the Selection of Sound Seed, by R. W. Jack, F.E.S.
No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.
No. 187. The Dusty Surface Beetle, by Rupert W. Jack, F.E.S.
No. 197. Chafer Beetles, by R. W. Jack, F.E.S.
No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.
No. 214. Some Household Insects, by R. Lowe Thompson, B.A.
No. 219. More Household Insects, by R. Lowe Thompson, B.A.
No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.
No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.
No. 249. Home-made Fly Papers, by Rupert W. Jack, F.E.S., Government Entomologist.
No. 261. Turnip Sawfly, by R. W. Jack, F.E.S.

VETERINARY.

No. 50. Epizootic Abortion in Cattle, by Ll. E. W. Bevan, M.R.C.V.S.
No. 51. Strangles, by F. D. Ferguson, M.R.C.V.S.
No. 53. Animals Diseases Consolidation Ordinance, 1904.
No. 65. Common Ailments of the Horse, by D. R. Chatterley, M.R.C.V.S.
No. 84. African Coast Fever—Diagnosis of Gland Puncture, by Ll. E. W. Bevan, M.R.C.V.S.
No. 95. Oestrus-ovis in Sheep, by Alec King.
No. 121. Rabies, by Ll. E. W. Bevan, M.R.C.V.S., and T. G. Millington, M.R.C.V.S., D.V.H.
No. 165. Report of Veterinary Conference, Bulawayo, April, 1913.
No. 180. Note on the Treatment of Biliary Fever of the Horse with Trypan Blue, by Ll. E. W. Bevan, M.R.C.V.S.
No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.
No. 195. Some Notes on the Systematic Dipping of Stock, by C. R. Edmonds, Assistant Chief Veterinary Surgeon, and Ll. E. W. Bevan, Government Veterinary Bacteriologist, Southern Rhodesia.
No. 202. Distomatosis or Liver Fluke in Cattle and Sheep, by Rowland Williams, M.R.C.V.S.
No. 223. A Note on Contagious Abortion, by Ll. E. W. Bevan, Government Veterinary Bacteriologist.
No. 272. African Coast Fever, by J. M. Sinclair, M.R.C.V.S., Chief Veterinary Surgeon.

LIVE STOCK.

No. 145. Prospects for Importation of Cattle from Australia, by Eric A Nobbs, Ph.D., B.Sc.
No. 190. The Principle of the Winter Feeding of Dairy Cattle, by R. C. Simmons.
No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.
No. 210. The Care and Feeding of Calves in Dairy and Stud Herds, by R. C. Simmons.
No. 211. The Fattening of Pigs on Granite Farms in Mashonaland, by R C. Simmons.
No. 227. An Experiment in Beef Production, by R. C. Simmons.
No. 229. Breeding and Feeding of Pigs for Bacon Factory Purposes, by R. C. Simmons.
No. 238. Compulsory Dipping, by E. A. Nobbs, Ph.D., B.Sc., and J. M. Sinclair, M.R.C.V.S.
No. 242. Construction of Dipping Tanks (Revised).
No. 243. Shedding for Milch Cows, by R. C. Simmons.
No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.
No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

MISCELLANEOUS.

No. 93. Formation of Agricultural Credit Associations in Rhodesia, by Loudon M. Douglas, F.R.S.E.
No. 129. How to Make Use of the "Fencing Ordinance, 1904," by N. H. Chataway.
No. 134. Plans and Specifications for Flue Curing Tobacco Barns.
No. 144. Rhodesian Tobacco—Prospects of an Australian Market, by Eric A. Nobbs, Ph.D., B.Sc.
No. 152. A School of Agriculture for Southern Rhodesia, by Eric A. Nobbs. Ph.D., B.Sc., Director of Agriculture.
No. 157. Hints on Brickmaking, by G. T. Dyke.
No. 168. Report on the Methods of Growing, Curing and Selling Bright Tobacco in Virginia, U.S.A., by H. Kay Scorror.
No. 184 Cream—Its Separation, Handling and Sale to Butter Factories, by R. C. Simmons.
No. 186. Concrete and Reinforced Concrete, by E. Hardcastle, M.I.E.E.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
No. 198. Poultry Keeping for the Rhodesian Farmer, by Frank Sheppard.
No. 199. Eucalypts for the Farm, by J. J. Boocock.
No. 205. Home Butter Making, by R. C. Simmons.
No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
No. 213. Hydraulic Rams, by W. Martin Watt.
No. 217. Windbreaks and Hedges, by F. B. Willoughby.
No. 224. Statistical Returns of Crops, 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 226. Classification of Clouds.
No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 231. Estimates of Maize and Tobacco Crops, 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 234. Eucalypts suitable to Southern Rhodesia, and how to Grow them, by F. B. Willoughby.
No. 236. Notes on Propagation by Means of Cuttings in Rhodesia, by F. B. Willoughby.
No. 237. The Analysis of Agricultural Products, Soils, Water, etc.
No. 241. Hints on Cement Concrete, by W. M. Watt.
No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., Director of Agriculture, and Fred. Eyles, F.L.S., Statistician.
No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C., Assistant Government Agricultural Chemist.
No. 254. Hints on Explosives, by W. M. Watt.
No. 255. Pound Fees.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 257. Maize Grading, by J. A. T. Walters, B.A.
No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 260. Rhodesian Farm Orchard, by A. G. Turner.
No. 263. How to Build a Cattle Crush (two methods), by J. H. Fleming and R. C. Simmons.
No. 264. Nature Notes—Adaptation, by C. F. M. Swynnerton, F.L.S.
No. 265. Rose Culture, by N. L. Kaye Eddie.
No. 266. Directory of Farmers. (Price 1s.)
No. 267. Trees for Farm and Ornamental Purposes, by W. E. Dowsett.
No. 270. Odzani River Irrigation Scheme, by W. M. Watt.
No. 271. Nature Notes—Plant Collecting, by F. Eyles, F.L.S.
No. 273. Enkeldoorn Produce Express Syndicate Rules.
No. 274. Lecture on Malaria and Blackwater, by A. M. Fleming, C.M.G., M.B., C.M., F.R.C.S.E., D.P.H., Medical Director.

Malarial Fever: How it is caused and how it may be prevented, by Sir Ronald Ross, F.R.C.S., D.Sc., LL.D., F.R.S., K.C.B., etc.

Malaria: its History, Prevention and Cure, by A. M. Fleming, C.M.G., M.B., F.R.C.S. (Ed.), D.P.H. (Camb.), Medical Director.

Game Law: Summary of.

Terms for Analysis by the Department of Agriculture, of Produce, Soils, Water, etc

HANDBOOK OF TOBACCO CULTURE for Planters in Southern Rhodesia. Sold by the Department of Agriculture. 2/6.

Employment on Farms.

The Department of Agriculture receives numerous enquiries from persons of varied attainments, age and financial position for openings on farms, as managers, assistants and learners, requiring remuneration on corresponding scales, or willing to give services in return for keep.

In order that work may be found for the above and needs of farmers met, applications are invited from both employers and persons seeking employment. Applications are also invited from artisans, such as masons, bricklayers, carpenters, fencers, well sinkers, concrete workers, and the like who may desire work on farms. In cases where employers have obtained the labour they require, or applicants for employment have found work, it is requested that notification be at once sent to the Department of Agriculture, in order that unnecessary correspondence be avoided.

Replies to the following applications should be addressed to the initials of the advertisers, c/o Director of Agriculture, who will forward the letter to the party referred to.

Note.—The following advertisements will not be repeated unless the advertisers inform us they wish them to be continued:—

SITUATIONS WANTED.

G. F. B.—Experienced cattle-man requires employment on farm or ranch.

A. McK.—Young man, rejected for army, with Rhodesian experience, desires work on stock farm for board and small remuneration.

W. P. S.—Requires work on farm; 25 years old; married.

Government Notices.

Government Notices affecting the farming industry will in future be published only *once* in the *Agricultural Journal*. This applies to original Notices and to amending Notices. Readers are, therefore, advised to preserve their files of back numbers of the *Journal*, to which they will be able to refer for information respecting the various laws, regulations, etc., in force.

No. 403 of 1917.] [19th October, 1917.

HIS Honour the Acting Administrator in Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to declare, in terms of section 17 of Government Notice No. 21 of 1917, the Victoria Commonage to be an area of infection.

No. 404 of 1917.] [19th October, 1917.

HIS Honour the Acting Administrator in Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notices Nos. 159 and 271 of 1917, and, in terms of section 17 of Government Notice No. 21 of 1917, to declare the following areas of infection and guard areas in lieu thereof :—

1. Melsetter Native District.

(a) *Areas of Infection.*

The farms Moosgwe, Kronstad, Weltevreden, Jameson, Rockwood, Cecilton, Wolverhampton, Helvetia and Woodstock.

(b) *Guard Areas.*

1. An area bounded by and including the following farms, viz., Grampians, Umzila, Houtberg, Smithfield, Flenters, Geluk, Wolvedraai, Busi, Old Town Lands, Groenvlei, Vlei Plaats, Waterfall, Highlands, Brackenbury, Zebra, Brooklyn, Fairview, Lemon Kop, Kingsley, Albany, Bloemhof, Ingorima Reserve, thence southward along the Anglo-Portuguese boundary to the first-named farm.

2. An area bounded by and including the following farms, viz., The Corner, Dunblane, Clifton, Welgegund, Riverange, The Drifts, Biriwiri, Nyanyadzi, Shinja, Westend, The Ranche, Oxenholme, Greystone, Greyville, Ruwaka, Quagga's Hoek, Ostend, Lusthof, Diepfontein, thence southward along the Anglo-Portuguese boundary to the first-named farm.

2. Umtali Native District.

(a) *Area of Infection.*

Farm Engwa.

(b) *Guard Area.*

An area bounded by the southern boundaries of the farms Reserve, Minyinga South, Madagascar, Cronley, Inyaruparu, to the Wengesi River, down this river to the Odzi River, and up the latter to the north-west beacon of Gilmerton; thence along the north and north-eastern boundaries of Gilmerton, the north-western boundary of Clydesdale, the northern boundary of Mazonwe, the northern boundary of Brown Hill to its north-east beacon on the Portuguese boundary; thence southward along this boundary to the south-east beacon of Reserve.

No. 425 of 1917.] [9th November, 1917.

AFRICAN COAST FEVER: COMPULSORY DIPPING OF CATTLE.

HIS Honour the Administrator in Council has been pleased, under the provisions of section 7 of the "Animals Diseases Consolidation Ordinance, 1904," to declare that, within the area defined below, on and after date of publication hereof, every owner of cattle shall cause same to be dipped in an approved dipping solution and in a dipping tank so constructed as to permit of total immersion of cattle, at such intervals as the Chief Inspector shall direct.

Description of Area.

An area in the native district of Victoria bounded by a line drawn from the south-west beacon of the farm Tentergate along the northern boundary of the Charambila Reserve to the eastern boundary of the Inyanda Block; thence in a southerly direction along the eastern boundary of this block to the Tokwe River; thence up the Tokwe River to its junction with the Umshandige River; thence up the latter to the farm Summerton; thence by and including the farms Summerton, Mzondo Mission, Rugby, Riverside, Copota, Fairview, Umyambi; thence in a southerly direction along the western boundary of the area described in Government Notice No. 249 of 1917 to the first-named point.

No. 451 of 1917.] [23rd November, 1917.

NOTWITHSTANDING anything to the contrary in the regulations published under Government Notice No. 21 of 1917, His Honour the Acting Administrator in Council has been pleased, under the powers vested upon him by the "Animals Diseases Consolidation Ordinance, 1904," to provide as follows:—

The movement of cattle for the purpose of sale at the Salisbury municipal stock yards may be permitted under such conditions as the Chief Inspector may prescribe. The granting of such permits and the nature and conditions to be attached thereto shall be at the absolute discretion of the Chief Inspector.

No. 424 of 1917.] [9th November, 1917.

AFRICAN COAST FEVER.

WHEREAS there has been an outbreak of destructive disease—to wit, African Coast Fever—on the Victoria commonage, Victoria district, His Honour the Administrator in Council has been pleased, under the powers vested in him by the "Animals Diseases Amending Ordinance, 1911," to declare the following area to be actively infected with African Coast Fever for the purposes of the said Ordinance.

Description of Area.

An area in the native district of Victoria bounded by a line drawn from the south-west beacon of the farm Tentergate along the northern boundary of the Charambila Reserve to the eastern boundary of the Inyanda Block; thence in a southerly direction along the eastern boundary of this block to the Tokwe River; thence up the Tokwe River to its junction with the Umshandige River; thence up the latter to the farm Summerton; thence by and including the farms Summerton, Mzondo Mission, Rugby, Riverside, Copota, Fairview, Umyambi; thence in a southerly direction along the western boundary of the area described by Government Notice No. 249 of 1917 to the first-named point.

No. 398 of 1917.] [19th October, 1917.

HIS Honour the Acting Administrator in Council has been pleased, under the provisions of section 9 of the "Compulsory Dipping Ordinance,

1914," to amend Government Notice No. 370 of 1916 by extending the period of dipping in the Makoni Reserve to intervals not exceeding fourteen days for a period of three months from date hereof.

No. 399 of 1917.] [19th October, 1917.

HIS Honour the Acting Administrator has been pleased, under the provisions of section 11 of the "Compulsory Dipping Ordinance, 1914," to approve of the appointment of the following members of the veterinary staff, for the purpose therein described, during their period of office :—

J. M. Sinclair.
C. R. Edmonds.
G. C. Hooper Sharpe.
R. O. Williams.
J. D. Ferguson.
M. H. Kingcome
B. L. King.
B. A. Myhill.
C. F. Johnston.
H. G. Morris.
A. P. L. Cazalet.
K. A. Leahy.
H. R. Kelly.
J. J. Kayser.
W. Imrie.
S. Alexander.
R. T. Taylor.
E. C. Weaver.
E. T. St. Quinton.
M. D. B. Crewe.
J. E. Creswick.
P. C. Cowen.
J. Whitie.
G. H. Stevens.
C. J. de Jager.
W. E. Harvey.
H. Meadows.
J. Allmark.
J. McKenzie.
D. G. Morris.
H. N. Coventry.
R. T. Little.
C. Denny.
J. Paxton.
V. M. Smith.
H. F. Hoste.
V. G. Phipps.
F. L. Harrington.
R. C. Lowick.
J. K. MacDonald.
A. Giese.
J. T. Miller.
G. W. Cumming.
H. E. Browne.
J. Donohoe.
J. Michie.
A. H. Nicholson.
A. Gifford.
R. R. B. Hopley.
T. G. Baxter.
C. F. Bertram.
F. A. Walling.

STRENGTH OF CATTLE DIPS.

WITH reference to Government Notice No. 178 of 1917, wherein is laid down the percentage solution of arsenious oxide required in cattle dips in areas in which dipping is compulsory under the "Animals Diseases Consolidation Ordinance, 1904," and the "Compulsory Dipping Ordinance, 1914," it is hereby notified for public information that the following dilutions of the dips now commonly used are required to conform to the standard solutions referred to :—

1. NATAL LABORATORY DIP.

For three-day dipping—
4 lbs. arsenite of soda (80 per cent. arsenious oxide) to every 400 gallons of water.

For seven-day dipping—
8 lbs. of arsenite of soda (80 per cent. arsenious oxide) to every 400 gallons of water.

For fourteen-day dipping—
12 lbs. of arsenite of soda (80 per cent. arsenious oxide) to every 400 gallons of water.

2. COOPER'S IMPROVED CATTLE DIP.

For three-day dipping—
1 gallon of dip to every 312 gallons of water.

For seven-day dipping—
1 gallon of dip to every 156 gallons of water.
For fourteen-day dipping—
1 gallon of dip to every 104 gallons of water.

3. ARSENODA DIP.
For three-day dipping—
1 gallon of dip to every 700 gallons of water.
For seven-day dipping—
1 gallon of dip to every 350 gallons of water.
For fourteen-day dipping—
1 gallon of dip to every 233⅓ gallons of water.

4. ST. O'GORMAN CATTLE DIP.
For three-day dipping—
1 gallon of dip to every 400 gallons of water.
For seven-day dipping—
1 gallon of dip to every 200 gallons of water.
For fourteen-day dipping—
1 gallon of dip to every 133⅓ gallons of water.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Veterinary Department,
Salisbury, November, 1917.

No. 416 of 1917.] [2nd November, 1917.

APPLICATIONS FOR USE OF WATER
in terms of Chapter I. of the "Water Ordinance, 1913."

IT is hereby notified that the following applications have been made, in terms of the "Water Ordinance, 1913," for authority to use water:—

Name of applicant.	From what river.	Native district of	For the purpose of irrigating a certain portion or portions of the
Ellen C. Steedman -	Que Que	Gwelo	Farm Gando
T. B. Hulley - -	Nyachua	Umtali	,, Shigodora
R. H. B. Dickson -	Unnamed	,,	,, Hoboken
A. Marton - -	Umtali	,,	,, Battery Spruit
T. M. Petrie - -	,,	,,	,, Fairview

Any person or persons whose rights may be affected thereby are hereby called upon, in terms of the regulations published under Government Notice No. 439 of 1915, to lodge, within three months from the date hereof, at the office of the Water Registrar, Salisbury, from whom further particulars are obtainable, their objections (if any) to the granting of these applications, together with a full statement of the grounds for such objections.

No. 420 of 1917.] [2nd November, 1917.

IT is hereby notified that, under and by virtue of the powers conferred by sub-section (1) of section 7 and by sub-section (4) of section 16 of the "Water Ordinance, 1913," and in accordance with the recommendations of the Water Court appointed in terms of Government Notice No. 147 of 1917, His Honour the Administrator has been pleased to authorise the following landowners to divert, impound, take and use public water, or to impound and store storm and surplus water, as severally specified, for irrigation purposes, as set out hereunder:—

To divert, impound, take and use public water as follows :—

Archibald Cameron Henderson—one-half of the public water in the Dasura River, measured at any point on his land on the farm Great B, in the district of Mazoe, for the irrigation of riparian land on the said farm.

Frederick Eyles—one-half of the public water in the Tatagura River, measured at any point on the farm Umsasa, in the district of Mazoe, for the irrigation of riparian land on the said farm.

Morris Singer—two-thirds of the public water in the Tatagura River, measured at the point where the river enters the plot known as Tatagura Extension, for the irrigation of riparian land on the plots Poort View, Tatagura and Tatagura Extension, in the district of Mazoe.

The British South Africa Company—one-half of the public water in the Mazoe River, measured at the site of a diversion weir existing in May, 1917, for the irrigation of riparian land on the farms Smithfield and Brundret, in the district of Mazoe.

Francis Marshall—one-third of the public water in the Mazoe River, measured at a point opposite the upper boundary of the farm Umzi, Glendale number 4, in the district of Mazoe, for the irrigation of riparian land on the said farm.

Francis Edward Appleyard—one-eighth of the public water in the Wengi River, measured at the site of a pumping station existing in May, 1917, on the farm Villa Franca, Glendale numbers 35 and 36, in the district of Mazoe, for the irrigation of riparian land on the said farm.

Edward Walter Lionel Noaks—one-fifth of the public water in the Wengi River, measured at the upper boundary of the farm Limbeck, Glendale number 38, in the district of Mazoe, for the irrigation of riparian land on the said farm.

The Rhodesia Lands, Limited—the whole of the public water in the Wakatai River, measured at the proposed site of a dam as shewn in a plan submitted to the Water Court, on the farm Belford Estate North, in the district of Mazoe, for the irrigation of riparian land on the said farm.

The Rhodesia Lands, Limited—the whole of the public water in the Umrodsi River, measured at the site of a dam and diversion weir existing in May, 1917, for the irrigation of riparian land on the farms Glendale numbers 5, 6 and 7, in the district of Mazoe.

Alfred Ernest Moorcroft—one-fifth of the public water in the Mazoe River, measured at any point on his riparian land, for the irrigation of such land on the farm Barassie, in the district of Mazoe.

Thomas Francis McDonnell—one-fifth of the public water in the Mazoe River, measured at any point on his riparian land, for the irrigation of such land on the farm Avoca, in the district of Mazoe.

Walter Edward Thurlow—one-half of the public water in the Poorti River, measured at any point on his land, for the irrigation of riparian land on the farm Atherstone, in the district of Mazoe.

John Mitchell Moubray—one-third of the public water in the Mazoe River, measured at the intake of the furrow existing in May, 1917, for the irrigation of riparian land on the farms Chipoli and Dillon, in the district of Mazoe.

Sophia Amelia Zaffere—the whole of the public water in the Mazoe River, measured at any point at which she desires to abstract it on riparian land on the farms Spelonken, Christon Bank and St. Gerera, in the district of Mazoe, for the irrigation of such riparian land.

Edward Scott—one-half of the public water in the Garanapudzi River, measured at the upper boundary of the farm Thorncreek, for the irrigation of riparian land on the farms Thorncreek and Wormwood, in the district of Mazoe.

Edward Scott—one-half of the public water in the Wengi River, measured at the upper boundary of the farm Nyachura, in the district of Mazoe, for the irrigation of riparian land on the said farm.

The foregoing grants are subjects to the following conditions :—

(1) That the amount of water specified in each grant, that is the whole or a part of the public water in a specified river, shall mean in each grant the amount as specified of the public water remaining after all rights (if any) of upper proprietors have been satisfied.

(2) That these grants are in respect of the whole area of the undivided farms named in each case. On any sub-division of any of the said farms, these grants shall be subject to revision in order to secure an equitable distribution of the water to the sub-divisions.

(3) That these grants are issued subject to the right of all others to whom the use of water may be lawfully granted to obtain the right to use and thereafter to use a reasonable share of the water in the rivers named.

Crofton Croker Townsend—to divert, impound, take and use the whole of the public water in the Mazoe River, measured at the site of a diversion weir existing in May, 1917, on the farm Lowdale, in the district of Mazoe, for the irrigation of riparian land on the said farm, on the following conditions :—

(1) That if at any time it is shewn that the use of the whole of the water deprives any lower proprietor of the use of water for primary or secondary purposes to which he may be entitled, then this grant shall be subject to revision.

(2) That this grant is in respect of the whole of the farm Lowdale, in extent approximately 1,500 morgen. On any sub-division of the farm this grant shall be subject to revision in order to secure an equitable distribution of the water to the sub-divisions.

(3) That this grant is issued subject to the right of all others to whom the use of water in the river may be lawfully granted to obtain the right to use and thereafter to use a reasonable share of the water in the said river.

Arthur Loreht Rubidge Morkel—to divert, impound, take and use the whole of the public water in the Umwindsi River, measured at a point near Mt. Murgwi (Lion's Head), in the Msana Native Reserve, where he proposes to construct a weir, provided he acquires the necessary servitude, for the irrigation of land on the farm Ceres, in the district of Mazoe, on the following conditions :—

(1) That if at any time it is shewn that the use of the whole of the water deprives any lower proprietor of the use of water for primary or secondary purposes to which he may be entitled, then this grant shall be subject to revision.

(2) That in this grant one whole of the public water shall mean one whole of the public water remaining after all rights (if any) of upper proprietors have been satisfied.

(3) That this grant is in respect of the whole of the farm Ceres, in extent approximately 4,612 acres. On any sub-division of the farm this grant is subject to revision in order to secure an equitable distribution of the water to the sub-divisions.

(4) That this grant is issued subject to the right of all others to whom the use of water in the river may be lawfully granted to obtain the right to use and thereafter to use a reasonable share of the water in the said river.

John Mitchell Moubray—to impound and store storm and surplus water in the dry spruit Mkuru at a point on the farm Chipoli West, being the eastern portion of the farm Ellerslie, for the purposes of irrigation on the said farm, in the district of Mazoe, on the following condition :—

That this grant is issued in respect of the whole of the farm Chipoli West, in extent approximately 2,000 acres. On any sub-division of the farm

this grant shall be subject to revision in order to secure an equitable distribution of the water to the sub-divisions.

The British South Africa Company—to divert, impound, take and use public water from the Mazoe River, and to impound, store and use storm and surplus water on their land at the site known as the Mazoe Poort, for the irrigation of riparian land on the farms known as the Mazoe Citrus Estate, in the district of Mazoe, on the following conditions :—

(1) That the storage dam shall be constructed by the British South Africa Company in such a manner and with foundations of such strength as will permit of the elevation of the storage dam to a height of one hundred feet.

(2) That, when there is a reasonable demand by other owners of land for water for irrigation purposes from the said storage dam, the British South Africa Company shall supply same at a fair rate. Any question as to the price of such water or as to the reasonableness of the demand to be referred to a Water Court for decision in the event of a dispute.

Further, that the British South Africa Company shall enlarge and extend the storage dam to a height of one hundred feet if necessary in order to provide for the supply of water, in excess of their own requirements, to other owners of land as aforesaid.

(3) That the said Company shall not impede the normal flow of the Mazoe River by the said impounding and storage.

(4) That, although there shall be no restriction as to the amount of water which the said Company may store and use, if at any time it is shewn that their use of the water deprives any lower proprietor of the use of water for primary or secondary purposes to which he may be entitled, then this grant shall be subject to revision.

(5) That this grant is in respect of the whole of the land known as the Mazoe Citrus Estate, in extent approximately 35,183 acres. On any subdivision of the estate this grant is subject to revision in order to secure an equitable distribution of the water to the sub-divisions.

(6) That this grant is issued subject to the right of all others to whom the use of water in the river may be lawfully granted to obtain the right to use and thereafter to use a reasonable share of the water in the said river.

NOTE (1) All the rights to the use of public water hereby notified shall lapse and be void if not used for a consecutive period of three years, if such failure to use is owing to the neglect or default of the persons possessing such rights.

(2) All the rights to the use of public water hereby notified are subject to any existing rights to water granted under the Mining Law, and shall not derogate from the right of miners to acquire water thereunder.

No. 450 of 1917.] [23rd November, 1917.

IT is hereby notified that, under and by virtue of the powers conferred by sub-section (1) of section 7 of the "Water Ordinance, 1913," His Honour the Acting Administrator has been pleased to authorise the following land owners to divert, impound, take and use public water as set out hereunder :—

Knight & Folkestad—one-half of the public water in the Umfuli River, measured at the bend of the said river immediately above that part of the river known as Hippo Pools, as shewn on plan attached to application, on the farm Umvovo, in the district of Hartley, for the irrigation of riparian land on the said farm.

Charlie Smith Marks—one-fifth of the public water in the Umfuli River, measured at the upper boundary of the farm Bedford South, in the district of Hartley, for the irrigation of riparian land on the said farm.

The foregoing grants are subject to the following conditions :—

(1) That the amount of water specified in each grant, that is, the whole or a part of the public water in a specified river, shall mean in each grant the amount as specified of the public water remaining after all rights (if any) of upper proprietors have been satisfied.

(2) That these grants are in respect of the whole area of the undivided farms named in each case. On any sub-division of any of the said farms, these grants shall be subject to revision, in order to secure an equitable distribution of the water to the sub-divisions.

(3) That these grants are issued subject to the right of all others to whom the use of water may be lawfully granted to obtain the right to use and thereafter to use a reasonable share of the water in the river named.

Note.—(1) All the rights to the use of public water hereby notified shall lapse and be void if not used for a consecutive period of three years, if such failure to use is owing to the neglect or default of the persons possessing such rights.

(2) All the rights to the use of public water hereby notified are subject to any existing rights to water granted under the Mining Law, and shall not derogate from the right of miners to acquire water thereunder.

No. 417 of 1917.] [2nd November, 1917.

GOVERNMENT Notice No. 343 of 31st August, 1917, is hereby cancelled.

It is hereby notified that all timber for a distance of 200 feet on either side of all public streams in Southern Rhodesia is hereby reserved, under section 12 (2) (d) of the "Mines and Minerals Ordinance, 1903," against cutting for mining purposes.

Note.—The definition of a public stream is as follows:—

"Public stream"—A natural stream of water—

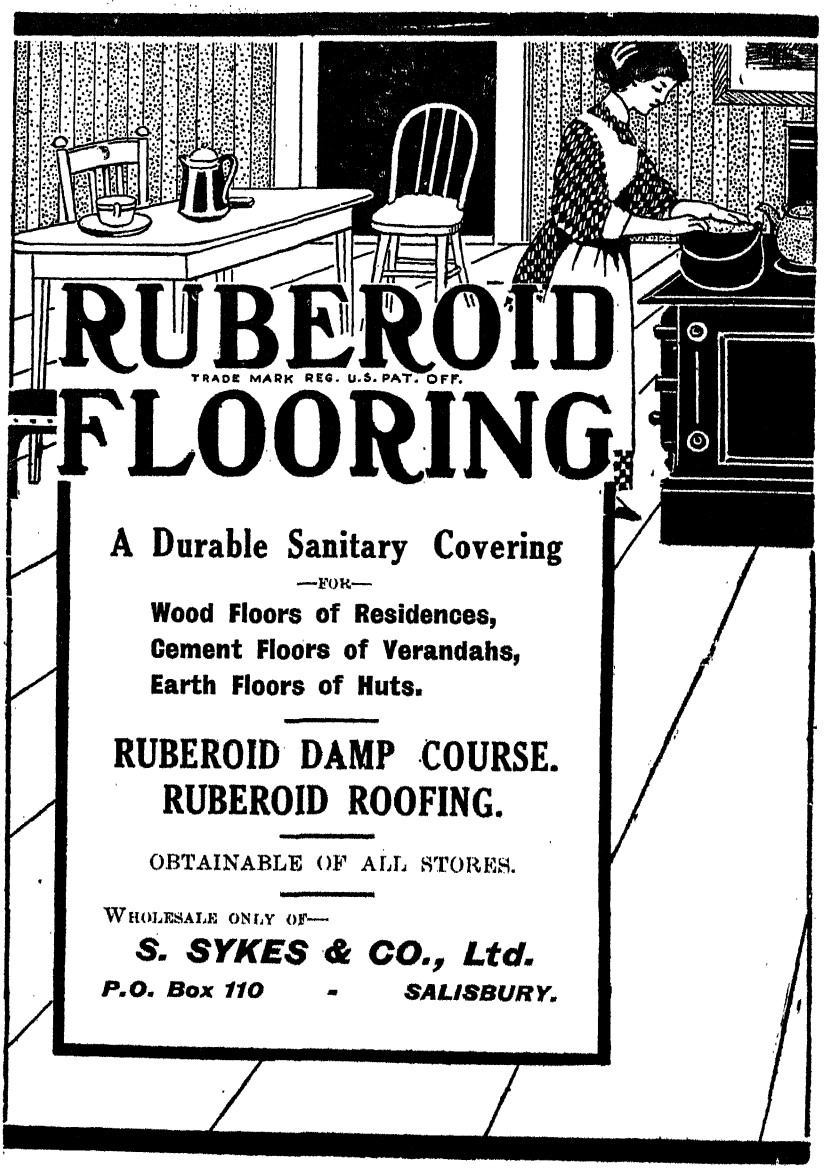
(1) which in ordinary seasons flows in a known and defined channel (whether or not such channel is dry during any period of the year) and

(2) which is capable of being applied to the common use of riparian proprietors.

No. 452 of 1917.] [23rd November, 1917.

PROTECTION OF KOORHAAN.

HIS Honour the Acting Administrator in Council has been pleased, under the provisions of the "Game Law Consolidation Ordinance, 1906," to declare that koorhaan shall be strictly protected, and not hunted or destroyed throughout Southern Rhodesia until further notice.


RUBEROID
TRADE MARK REG. U.S. PAT. OFF.
FLOORING
A Durable Sanitary Covering
—FOR—
Wood Floors of Residences,
Cement Floors of Verandahs,
Earth Floors of Huts.
RUBEROID DAMP COURSE.
RUBEROID ROOFING.
OBTAINABLE OF ALL STORES.
WHOLESALE ONLY OF—
S. SYKES & CO., Ltd.
P.O. Box 110 - SALISBURY.

Rhodesia Agricultural Journal.

INDEX, VOLUME XIV., 1917.

PAGE

Acknowledgment (Editorial) 316
Adaptation, Nature Notes, by C. F. M. Swynnerton, F.L.S. 339
African Coast Fever 614
Agricultural Congress (Editorial) 156
,, Outlook 88, 257, 407, 530, 658, 764
,, Shows, 1917, Dates of (Editorial) 157
,, ,, Dates of Rhodesian, 1917 331
,, Society, Witwatersrand (Editorial) 465
,, Statistics (Editorial) 696
,, Union Congress 23
Alteration in *Journal* (Editorial) 591
Analysis, Chemical (Editorial) 6
,, ,, See "Departmental Notices."
,, of Soils, Water and Products. See "Departmental Notices."
Animals, Ocean Freight on Stud, for Rhodesia (Editorial) 2
Animal Produce, Live Stock, Statistics of, 1916, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 184
Arsenical Dips, the Restraining Influence of Cyanide upon Oxidation, by A. G. Holborow, F.I.C. 733
Associations, Farmers', Dates of Meetings. See "Farmers' Associations."
Athalia Flacca, the Turnip Sawfly, by R. W. Jack, F.E.S. 206

Bacon Factory 60
Beef Feeding Experiment No. 3, by R. C. Simmons 24
,, ,, No. 2 (Correspondence) 83
,, Rhodesian, on Smithfield Market 196
Bee Keeping. See "Farming Calendar."
Birds as Tick Destroyers (Editorial) 463
,, ,, Carriers (Correspondence) 656
Bird Life on an Umtali Farm, Nature Notes VII., by Lionel Cripps, M.L.C. 743
Blackwater and Malaria, by A. M. Fleming, C.M.G., M.B., etc., etc. 638
Block Tests, Salisbury Fat Stock Show, 1916 80
Botanical Specimens for Identification 562
Bread, Maize and Wheat, two Recipes 256
Broom Corn 521
,, (Editorial) 596

PAGE

Broom Corn, by J. A. T. Walters, B.A. 755
Buckwheat, Cultural Notes, by J. A. T. Walters, B.A. 63
Bulletins, Departmental 125, 285, 437, 563, 686, 785

Calamistis Fusca, Hmpsn. (Maize Stalk Borer), by R. W. Jack, F.E.S. 707
Calendar, Farming 95, 261, 412, 535, 661, 767
Case Weavers (Psychidae), Nature Notes, by Miss B. C. Chamberlain 630
Cattle Crush, how to build, by J. H. Fleming and R. C. Simmons 332
,, Dip, Oxidation of when Bottled, by A. W. Facer 202
,, Export to the Union (Editorial) 592
,, Feeding Experiment No. 3, Criticism on (Correspondence) ... 252
,, Marketing in the United States 66
,, and Pig Trough, by C. J. Shirley 517
,, Statistics (Editorial) 698
,, ,, ... 763
,, Stud, Sale of (Editorial) 313
Charges for Analysis. See "Departmental Notices."
,, Dipping. See "Departmental Notices."
,, Services of Agricultural Engineer. See "Departmental Notices."
,, Services of Government Veterinary Surgeons. See "Departmental Notices."
Cheese and Butter Dairy, by R. C. Simmons and G. U. Fripp 727
Chemical Analyses. See "Departmental Notices."
,, (Editorial) 6
Cicadas and their Relatives, Nature Notes, by C. H. Pead, M.I.M.M. 240
Citrus Culture. See "Departmental Notices."
,, Fruits. See "Farming Calendar."
Congress, Agricultural (Editorial) 156
,, ,, Union 23
Correction, Fat Stock Show (Editorial) 159
Corrections (Editorial) 316
Cost of Mealie Production (Correspondence) 253
Cows, Export of (Editorial) 4
Criticism of Cattle Experiment No. 3 (Correspondence) 252
Crops, Cultural Notes on Rhodesian, Onions, by J. A. T. Walters, B.A. 61
,, ,, ,, Root Crops, by J. A. T. Walters, B.A. 235
,, See "Departmental Notices" and "Farming Calendar."
Crop Experiments, Season 1916-17, Part I., Gwebi Farm, by E. A. Nobbs, Ph.D., B.Sc. 608
,, Season 1916-17, Part II., Gwebi Farm, by E. A. Nobbs, Ph.D., B.Sc. 717
Crops, Maize and Tobacco, Prospects of, 1917, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 160
,, New for Rhodesia, by J. A. T. Walters, B.A. 327
,, Notes on Return of, Harvested in 1916, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 29
Crush, Cattle, how to Build, by J. H. Fleming and R. C. Simmons 332, 337
Cultural Notes on Rhodesian Crops, Root Crops, by J. A. T. Walters, B.A. 235
,, ,, Onions, by J. A. T. Walters, B.A. 61

PAGE

Culture of Roses, by N. L. Kaye-Eddie 362
Cyanide, Restraining Influence of in Arsenical Dips, by A. G. Holborow, F.I.C. 733

Dairy for Farm Cheese and Butter, by R. C. Simmons and G. U. Fripp 727
Dates of Agricultural Shows, 1917 (Editorial) 157
,, Farmers' Associations' Meetings. See "Farmers' Associations."
,, Rhodesian Agricultural Shows, 1917 331
Deciduous Fruits. See "Farming Calendar."
Departmental Bulletins. See "Bulletins."
,, Notices 110, 274, 425, 549, 676, 782
Dhal (Editorial) 157
Dip at St. Faith's Mission, by Rev. E. Lloyd 400
Dips, Arsenical, the Restraining Influence of Cyanide upon Oxidation in, by A. G. Holborow, F.I.C. 733
,, Cattle, Oxidation of when Bottled, by A. W. Facer 302
Dipping of Cattle, Charges for. See "Departmental Notices."
,, Tank, Stone (Editorial) 701
Director of Agriculture, Report, Extract from for 1916 317, 467
Directory of Farmers (Editorial) 314
,, ,, in Southern Rhodesia 366
Drying out of Rhodesian Maize (Editorial) 697
Diseases of Poultry, by F. Sheppard 248

Eel Worm (Correspondence) 406
Emperor Moths, by Rev. Fr. O'Neil, S.J. 47
Employment on Farms 289, 441, 567, 690, 789
Encouragement of Poultry Farming (Editorial) 312
Enkeldoorn Produce Express (Editorial) 595
,, ,, Syndicate, Rules and Regulations 633
Entomological. See "Farming Calendar."
Entomology. See "Departmental Notices."
Erosion, Soil (Editorial) 593
Experiment, Beef Feeding, No. 3, Gwebi, by R. C. Simmons 24
,, ,, No. 2 (Correspondence) 83
Experiments, Comments on (Correspondence) 251
,, Cattle Feeding, No. 3, Criticism on (Correspondence) ... 252
,, Crops at Gwebi Farm, 1916-17, Part I., by E. A. Nobbs, Ph.D., B.Sc. 608
,, Crops at Gwebi Farm, 1916-17, Part II., by E. A. Nobbs, Ph.D., B.Sc. 717
,, Maize Manuring at Gwebi, by A. G. Holborow, F.I.C. 494
Experiment Stations, Government (Editorial) 155
Export of Cattle to the Union (Editorial) 592
,, of Cows (Editorial) 4
Explosives, Hints on, by W. M. Watt 70

Farmers' Directory (Editorial) 314
,, ,, Southern Rhodesia Farmers 366
,, Associations, Dates of Meetings 109, 273, 424, 548, 675, 781

PAGE

Farming Calendar. See "Calendar."
,, in Granite Country, by R. C. Simmons 495
Farm Orchard, Rhodesian, by A. G. Turner 189
,, Statistics (Editorial) 1, 314
Fat Stock Show, Salisbury 80
,, ,, Correction (Editorial) 159
Feeding, Beef Experiment No. 2 (Correspondence) 83
,, ,, No. 3, by R. C. Simmons 24
Fertiliser, Rhodesia Maize, by A. G. Holborow, F.I.C. 357
Flower Garden. See "Farming Calendar."
Foods, Maize, for the Home 645, 757
Freight, Ocean, on Stud Animals for Rhodesia (Editorial) 2
Fruit, Citrus. See "Farming Calendar."
,, Deciduous. See "Farming Calendar."
Forestry. See "Farming Calendar."
,, Sale of Trees. See "Departmental Notices."

Government Experiment Farm, Gwebi (Editorial) 311
,, ,, Station (Editorial) 155
,, Notices 129, 290, 442, 569, 691, 740
Grading of Maize, 1917, by J. A. T. Walters, B.A. 164
Granite Country, Farming in, by R. C. Simmons 495
Grapes (Correspondence) 254
Gwebi Crops (Editorial) 596
,, Experiment Farm (Editorial) 311
,, ,, Merino Sheep on 94
,, ,, Maize Manuring, by A. G. Holborow, F.I.C. 491
,, Farm, Report on Crop Experiments, Season 1916-17, Part I., by E. A. Nobbs, Ph.D., B.Sc. 608
,, ,, Report on Crop Experiments, Season 1916-17, Part II., by E. A. Nobbs, Ph.D., B.Sc. 717

Hay Rack, A Useful 195
Hereford Breeders' Society 402
Hints on Explosives, by W. M. Watt 170
Homesteads, Farm (Editorial) 6
Horsesickness (Editorial) 3

Illustrations (Editorial) 466
Immunity, an Appreciation (Editorial) 158
,, Part III., by L. E. W. Bevan, M.R.C.V.S. 213
Imperial Institute, Reports on Oil Seed 749
,, ,, and Rhodesian Products 752
Information for Farmers. See "Departmental Notices."
Inoculation (Editorial) 159
Irrigation. See "Departmental Notices."
,, Scheme, Odzani River, Umtali District 518

Journal, Alteration in (Editorial) 591

Koorhaan, Protection of (Editorial) 701

PAGE

Land and Assistance for Soldier and Sailor Settlers 702
,, for Soldier Settlers, War Settlement Department (Editorial) ... 699
Lectures for Farmers. See "Departmental Notices."
Live Stock. See "Departmental Notices."
,, and Animal Produce, Statistics of for 1916, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 184
,, and Produce at 1917 Shows 617
Locusts (Editorial) 700

Maize, Drying out of (Editorial) 697
,, Fertiliser, Rhodesia, by A. G. Holborow, F.I.C. 357
,, Foods for the Home 645, 757
,, Grading, 1917, by J. A. T. Walters, B.A. 164
,, Manuring on the Experiment Farm, Gwebi, by A. G. Holborow, F.I.C. 491
,, Purchase of Rhodesian by the Imperial Government 38
,, Rhodesian, Drying out of (Editorial) 697
,, Sale of to Imperial Government (Editorial) 696
,, Salisbury White, in Australia (Editorial) 313
,, Stalk Borer (Calamistis Fusca, Hmpsn.), by R. W. Jack, F.E.S. 707
,, and Tobacco Crops of 1917, Prospects of, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 160
,, and Wheat Bread, two Recipes 256
Malaria and Blackwater, by A. M. Fleming, C.M.G., M.B., etc., etc. 638
Manuring of Maize on Gwebi Experiment Farm, by A. G. Holborow, F.I.C. 491
Marketing Cattle in United States 66
Mealie Production, Cost of (Correspondence) 253
Meat Export Trade (Editorial) 461
Merino Sheep at Gwebi Farm, by R. C. Simmons 359

Napier Fodder 167
Nature Notes (Editorial) 159
,, I., Emperor Moths, by Rev. Fr. O'Neil, S.J. 47
,, II., Cicadas and their Relatives, by C. H. Pead, M.I.M.M. 240
,, III., Adaptation, by C. F. M. Swynnerton, F.L.S. 339
,, IV., Plant Collecting, by F. Eyles, F.L.S. 523
,, V., The Snakes of the Plumtree District, by Rev. Fr. O'Neil, S.J. 623
,, VI., Psychidæ, or Case Weavers, by Miss B. C. Chamberlain 630
,, VII., Bird Life on an Umtali Farm, by Lionel Cripps, M.L.C. 743
New Crops for Rhodesia, by J. A. T. Walters, B.A. 327, 737

Obituary Notices: Lieut. N. H. A. Ready, Mr. Harry Comaroff ... 597
,, Mr. George Pinchin 315
Odzani River Irrigation Scheme, Umtali District, by W. M. Watt ... 518
Oil Factory 655
,, Seed, Report on, by Imperial Institute 749
Onions, Cultural Notes on, by J. A. T. Walters, B.A. 61

PAGE

Orchard, the Rhodesian Farm, by A. G. Turner 189
Oxidation of Cattle Dips when Bottled, by A. W. Facer 202
,, in Arsenical Dips, Influence of Cyanide, by A. G. Holborow, F.I.C. 733

Pig and Cattle Trough, by C. J. Shirley 517
Plant Collecting, Nature Notes, by F. Eyles, F.L.S. 523
Poisonous Plants. See "Departmental Notices."
Potatoes (Editorial) 312
,, Seed (Editorial) 6
Poultry. See "Farming Calendar."
,, Diseases, by F. Sheppard 248
,, Farming, Encouragement of (Editorial) 312
,, Rations for (Correspondence) 403
Pound Fees, Schedule of 76
Prize for Wheat Growing (Editorial) 701
Produce and Live Stock at 1917 Shows 617
Produce, Animal, and Live Stock, Statistics of for 1916, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 184
,, Express, Enkeldoorn (Editorial) 595
,, ,, Syndicate, Enkeldoorn, Rules and Regulations ... 633
Production of Wheat in Southern Rhodesia 68
,, Winter Wheat on Granite Formation in Rhodesia, by Cecil Wilmot 180
Products, Analysis of, Charges. See "Departmental Notices."
Prospects of Maize and Tobacco Crops, 1917, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 160
Protection of Koorhaan (Editorial) 701
Purchase of Rhodesian Maize by Imperial Government 38
Psychidæ, or Case Weavers, Nature Notes, by Miss B. C. Chamberlain 630

Quarter-Evil, by C. R. Edmonds, M.R.C.V.S., and G. Pinchin, M.R.C.V.S 43
,, by A. Stewart Richardson 597
,, Note on, by J. M. Sinclair, M.R.C.V.S. 605
,, by C. R. Edmonds, M.R.C.V.S. 583

Rations for Poultry (Correspondence) 403
Report, Abridged, of the Chief Veterinary Surgeon, for 1916 479
,, on Crop Experiments at the Government Farm, Gwebi, Season 1916-17, by E. A. Nobbs, Ph.D., B.Sc. 608
,, of the Director of Agriculture, Extracts from, for 1916 317, 467
Reports on Oil Seed, by the Imperial Institute 749
Restraining Influence of Cyanide upon Oxidation in Arsenical Dips, by A. G. Holborow, F.I.C. 733
Rhodesia Meat Packing Co. (Editorial) 592
Rhodesian Beef on Smithfield Market 197
,, Quarter-Evil, by A. Stewart Richardson 597
Root Crops, Cultural Notes on, by J. A. T. Walters, B.A. 235
Rose Culture, by N. L. Kaye-Eddie 362

Sale of Maize to Imperial Government (Editorial) 696
,, Stud Cattle (Editorial) 313

PAGE

Salisbury White Maize in Australia (Editorial) 313
Samples. See "Departmental Notices."
,, for Examination (Editorial) 4
Seed, Disposal of Pure. See "Departmental Notices."
Services of Government Veterinary Surgeons. See "Departmental Notices."
Sheep, Merino, on Gwebi Farm 94
,, ,, at Government Experiment Farm, by R. C. Simmons 359
Shortage of Farm Supplies (Editorial) 314
Show, Fat Stock, Salisbury, Block Tests 80
,, ,, Correction (Editorial) 159
,, the Rand (Editorial) 7
Shows, Dates of Agricultural, 1917 (Editorial) 157
,, ,, Rhodesian Agricultural, 1917 331
,, 1917, Notes on Live Stock and Produce 617
Shrubs for Sale. See "Departmental Notices."
Snakes of the Plumtree District, by Rev. Fr. O'Neil, S.J. 623
Soil Erosion (Editorial) 593
Soils, Analyses of, and Charges. See "Departmental Notices."
,, of Southern Rhodesia and their Origin, by H. B. Maufe, B.A. 8
Soldier Settlers, War Settlement Department (Editorial) 699
,, and Sailor Settlement, Offer of Land and Assistance 702
Spaying Sows 401
Specimens, Botanical, for Identification 507
Stalk Borer, Maize, by R. W. Jack, F.E.S. 707
Statistics, Agricultural (Editorial) 695
,, Cattle (Editorial) 698
,, ,, ... 763
,, Farm (Editorial) 1, 314
,, of Live Stock and Animal Produce, 1916, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 184
Stock. See "Farming Calendar."
,, Show, Fat, Salisbury 30
Stone Dipping Tanks (Editorial) 701
Stud Animals for Rhodesia, Ocean Freight on (Editorial) 2
,, Cattle, Sale of (Editorial) 313
Sunflowers, the Market for 508

Tick Carriers, Birds as (Correspondence) 657
,, Destroyers, Birds as (Editorial) 463
Tobacco. See "Farming Calendar."
Tobacco and Maize Crops, 1917, Prospects of, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S. 160
Trees, Sale of. See "Departmental Notices."
,, Suitable for Farm and Ornamental Purposes, by W. E. Dowsett 487
Trough for Cattle and Pigs, by C. J. Shirley 517
Trypanosomes, Transmission of by Flies other than Tsetse, by H. E. Hornby, M.R.C.V.S., D.V.S.M. 168
Turnip Sawfly (Athalia flacca), by R. W. Jack, F.E.S. 206
Turkish Tobacco 5
Tyres Ordinance, 1916 93

PAGE

Vegetable Garden. See "Farming Calendar."
Veterinary Report (Monthly) 89, 258, 408, 531, 659, 765
,, See "Farming Calendar."
,, Surgeon, Chief, Abridged Report for 1916 479

Water, Analyses of, and Charges. See "Departmental Notices."
War Settlement Department, Land for Soldier Settlers (Editorial) ... 699
,, in Southern Rhodesia 702
Weather Bureau 101, 265, 416, 540, 667, 773
,, See "Farming Calendar."
Wheat Growing, Prize for (Editorial) 701
,, ,, in Rhodesia, to Encourage 183
,, Production in Rhodesia 68
,, ,, of Winter, in Rhodesia, on Granite Formation, by Cecil Wilmot 180
Winter Wheat, by J. A. T. Walters, B.A. 177
Witwatersrand Agricultural Society (Editorial) 465
Wood, W. S. (Editorial) 6

AUTHORS.

PAGE

Chamberlain, Miss B. C., Shangani—
Psychidæ, or Case Weavers 630

Cripps, Lionel, M.L.C.—
Bird Life on an Umtali Farm 743

Dowsett, W. E.—
Trees Suitable for the Farm and Ornamental Purposes 487

Eddie, N. L. Kaye—
Rose Culture 362

Edmonds, C. R., M.R.C.V.S.—
Quarter-Evil 43, 483

Eyles, F., F.L.S.—
Notes on Return of Crops Harvested in 1916 29
Prospects of Maize and Tobacco Crops, 1917 160
Statistics of Live Stock and Animal Produce for the Year 1916 ... 184
Plant Collecting 523

Facer, A. W.—
An Investigation of the Oxidation of Cattle Dips when Bottled 202

Fleming, A. M., C.M.G., M.B., C.M., F.R.C.S.E., D.P.H.—
Notes from Lecture on Malaria and Blackwater 638

Fleming, J. H.—
How to Build a Cattle Crush 332

Holborow, A. G., F.I.C.—
Manuring of Maize at Government Experiment Farm, Gwebi ... 491
The Restraining Influence of Cyanide upon Oxidation in Arsenical Dips 733

Hornby, H. E., M.R.C.V.S., D.V.S.M.—
Transmission of Cattle Trypanosomes by Flies other than the Tsetse 168

Jack, R. W., F.E.S.—
The Turnip Sawfly (Athalia flacca) 206
The Maize Stalk Borer (Calamistis fusca, Hmpsn.) 707

Maufe, H. B., B.A.—
The Soils of Southern Rhodesia and their Origin 8

Nobbs, E. A., Ph.D., B.Sc.—
Notes on Returns of Crops Harvested in 1916 29
Prospects of Maize and Tobacco Crops, 1917 160
Statistics of Live Stock and Animal Produce for the Year 1916 184
Report on Crop Experiments at the Government Farm, Gwebi, 1916-17, Parts I. and II. 608, 717

PAGE

O'Neil, the Rev. Father, S.J.—
Emperor Moths ... 47
Snakes of the Plumtree District ... 623

Pead, C. H., M.I.M.M.—
Cicadas and their Relatives ... 240

Pinchin, G., M.R.C.V.S.—
Quarter-Evil ... 43

Richardson, A. Stewart—
Rhodesian Quarter-Evil ... 597

Sheppard, F.—
Diseases of Poultry ... 248

Simmons, R. C.—
Beef Feeding Experiment No. 3, Gwebi ... 24
How to Build a Cattle Crush ... 332
Merino Sheep at Government Experiment Farm ... 359
Farming in Granite Country ... 495
A Farm Cheese and Butter Dairy (R. C. Simmons and G. U. Fripp) ... 727

Sinclair, J. M., M.R.C.V.S.—
Notes on Quarter-Evil ... 605

Swynnerton, C. F. M., F.L.S.—
Adaptation ... 339

Turner, A. G.—
The Rhodesian Farm Orchard ... 189

Watt, W. M.—
Hints on Explosives ... 70
Odzani River Irrigation Scheme, Umtali District ... 518

Walters, J. A. T., B.A.—
Cultural Notes on Rhodesian Crops, Onions and Buckwheat ... 61
,, ,, Root Crops ... 235
Maize Grading, 1917 ... 164
Winter Wheat ... 177
New Crops for Rhodesia ... 327, 737
Broom Corn ... 755

ILLUSTRATIONS.

	Facing Page
Mr. J. F. Templeton's Homestead, Farm Glenluce	Frontispiece, February
Mr. T. H. Newmarch's Homestead, Farm Glenara	4
Oat Harvest, Mr. R. H. Futter's Farm, Makwiro	4
Mr. J. T. English's Friesland Bull, "Jan Smuts"	24
Maize Farmers, 1916 (Diagram I.)	36
Wheat Farmers, 1916 (Diagram II.)	36
Tobacco Farmers, 1916 (Diagram III.)	36
Citrus Growers, 1916 (Diagram IV.)	36
Farmers using Silage (Diagram V.)	36
Emperor Moths: Argema mimosæ, *Boisd.*—Male	48
,, Bunaea sp.—Female	48
,, Gyanisa semialba, *Sauth*—Female	52
,, Imbrasia sp.—Female	52
,, Copaxa flavinata, *Walk*—Female	52
,, Bunaea macrothyris, *Roths.*—Male	56
,, Ludia sp.—Female	56
,, Decachorda pomona, *Weign.*—Male	56
,, Nudaurelia sp.—Male	56
,, Gonimbrasia hyperbius, *Westw.*—Female	56
Blasting by Electricity, Odzani Furrow	72
Mr. Barnes Pope's Homestead, Rusape	Frontispiece, April
Scheme of the Mouth of Blood-sucking Fly (2 Diagrams)	172
Early Gluyas Wheat, Headlands	180
Grapes grown by Mr. J. C. Rodger, Bulawayo	180
Wickson Plum Tree	189
Hay Rack (2 Diagrams)	195
Turnip Sawfly (2 Plates)	206
Turnips Injured by Sawfly (Plate II.)	206
Yearling Sussex Bulls (Mr. L. Glanfield)	220
Hereford Heifer, "Glen II." (Mr. J. Mack)	220
Shorthorn Bull, "Cluny Marmion" (Mr. P. H. Gresson)	220
Cicadas (2 Plates)	240
,,	244
Salisbury Experiment Station, April, 1917	Frontispiece, June
Indian Cane at Salisbury Experiment Station	328
A Native Grass (Panicum sp.)	328
Molasses Grass (Melinis minutiflora)	328
Sudan Grass	328
White-seeded Velvet Bean	330
Napier Fodder, Guinea Grass and Dhal grown in alternate rows	330
Dhal in its fifth year (Cajanus indicus)	330
Chili Oil Seed (Madia sativa)	330
Branding Squeezer in use (2 Plates)	332

	Facing Page
Model of Cattle Squeezer	334
Cattle Crush for use on Farm (Diagram)	338
Butterflies (2 Plates)	342
,, ,, ...	346
,, and Beetles	352
Foliage of Blackwood	354
Stone Dipping Tank at St. Faith's Mission, Rusape	400
Forest Hill, Makoni Frontispiece, August	
Rhodesian Beef at Smithfield	462
Homestead of Messrs. S. & A. Jones, Staunmore, Victoria	466
Horses bred by Messrs. Harvard & Harvard, Moria, Headlands ...	466
Cupressus elegans and C. glauca	488
Jacaranda mimosæfolia and Cupressus arizonica	488
Casuarina suberosa and Bambusa vulgaris	489
Typical Granite Country, Makoni	504
A Cheap Iron Trough (Diagram)	517
Odzani Furrow (4 Plates)	518
,, ,, ...	520
Mr. R. H. Wood's Homestead, Exeter Farm, Mrewa Frontispiece, October	
Pure-bred Friesland Calves on the Government Experiment Farm Gwebi	606
Troop of Horses bred by Mr. W. F. White, on Vrygewecht Farm, Figtree	622
Grade North Devon-Africander Cattle, on Mr. W. F. White's Farm, Vrygewecht	622
Psychidæ, or Case Weavers	633
Mr. A. H. Day's Homestead, Sable Range, Marandellas	638
Young Stock on Sable Range Farm, Marandellas	638
Elephant Hunting in Rhodesia (2 Plates)	654
Wheat Thrashing, Premier Estate (2 Plates) Frontispiece, December	
Maize Stalk Borer (Diagram and 2 Plates)	710
Plan and Elevation of Cheese and Butter Dairy	726
Broom Corn Head, minimum size required by Capetown Market ...	756

Indian Agricultural Research Institute (Pusa)
LIBRARY, NEW DELHI-110012

This book can be issued on or before

Return Date	Return Date